

Oct 3, 1966

2018

Notes
10-3-66
Held for DIR's
return

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Dr. von Braun, DIR

DATE MAR 7 1967

FROM Director, Operations Management Office, R-OM-DIR

SUBJECT MSFC-MSD Cooperation

Reference is made to my memorandum to you, dated November 30, 1966, subject: MSFC Centrifuge Gondola Testing for MSD, and your reply to me asking for a summary of the various tasks that we are doing for MSD. Attached is a brief summary of six jobs that we are doing, or have just finished, for MSD; together with a short listing of mutual support efforts conducted as a normal part of Panel and Committee activities.

W. H. Mc Cartney
for W. S. Fellows

1 Enc:
As stated



MSFC Support to MSC

RACK:

A memorandum from Dr. Gilruth to Dr. von Braun, dated July 20, 1966, established the requirement for five flight items of RACK. R-P&VE was given the Lead Lab Assignment on July 29, 1966. Mr. George Keller is the Engineering Manager. The Research and Development Plan (RDP) was approved and forwarded to IO on August 16, 1966. The first RACK is programmed for AS-504. Estimated total funding requirement is \$809,000. MSC has transferred \$585,000 to MSFC for this effort. The additional \$224,000 has been made available from Saturn V funds. The estimated total manpower requirements are 112 civil service man-years and 26 support contractor man-years. Estimated completion date is January 1971.

NOSE CONE:

Teletype from General Phillips to MSC and MSFC, dated May 5, 1966, authorized MSFC to provide Nose Cones for vehicles AS-208 and AS-210. On May 18, 1966, Dr. Shea of MSC requested that MSFC supply an additional Nose Cone for vehicle AS-206. Lead Laboratory Assignment was made to R-P&VE on May 27, 1966, with Mr. W. A. Brooksbank appointed as Engineering Manager. The Research and Development Plan (RDP) was approved and forwarded to Industrial Operations August 16, 1966. On October 14, 1966, NASA Headquarters authorized an additional Nose Cone for vehicle AS-212. Subsequent mission changes reassigned the four Nose Cones to vehicles AS-206, -208, -209, and -210. Estimated total cost for the four Nose Cones is \$400,000; all funding provided by MSC. Allocations are R-P&VE, \$125,000 and R-ME, \$275,000. Estimated total manpower requirements are 69 civil service man-years and 20 support contractor man-years. Estimated completion date is January 1971.

EVALUATION TESTING OF BI-PROPELLANT VALVES AND SHUT-OFF VALVES:

The Director of Engineering and Development, MSC, in a letter to Mr. Weidner requested that MSFC accomplish testing on bi-propellant valves and shut-off valves. The project was assigned to R-QUAL in July 1966, and is being performed in the Environmental Test Branch by support contractors. Estimated total cost for the testing is \$8,215 to be funded by MSFC. No MSC funds have been provided. Estimated completion date is June 1967.

BACK-UP CAPABILITY FOR SATURN V, IF ATTITUDE REFERENCE SYSTEM FAILED:

Letter from Dr. von Braun to Dr. Gilruth, dated November 28, 1966, stated that NASA Headquarters requested MSFC provide MSC support in subject area. A joint MSFC/MSC task team was established to perform the analysis and criteria. ASTR is R&DO's performing laboratory. This effort was begun in October 1966, and is scheduled for completion October 1967. A total of one civil service man-year is estimated for this project and will be used mainly for consultant work and for team meetings.

CENTRIFUGE GONDOLA TEST:

The Assistant Director of Engineering and Development at MSC, in a letter to Mr. Weidner, dated January 11, 1966, requested that the Centrifuge Gondola Testing be accomplished by MSFC. The work was begun by R-ME in March 1966, and completed in October 1966. MSC allocated \$40,000 to MSFC for this task.

STUDY OF CHEMICAL EFFECTS ON TITANIUM ALLOYS:

MSC became aware that minor changes in N_2O_4 (nitrogen tetroxide) could drastically alter stress corrosion rates of titanium vessels. In order to verify that changes in composition resulting from storage or use environment

will not result in tank or system failures, MSC requested that MSFC make a thorough study of inhibitions and reactions of N_2O_4 with titanium alloys. The scope of work and allocation of \$100,000 for this task was received in October 1966. MSFC is doing additional work on titanium alloys and the MSC work was added to the in-house work. No specific breakdown of cost has been made. However, it is assumed that the task will be accomplished within the dollars allocated to R-P&VE, Materials Division.

MSFC and MSC

Both Centers are constantly working together on routine work such as; wind tunnel testing, flight evaluations of meteorological data tape, wind data for structural-control studies and climate data, prelaunch wind data, computer programs and data reductions, camera coverage, flight mission rules, and flight mechanics. These tasks are in connection with the mission assignments and are self-compensating. For example:

a. Ground and in-flight wind data are furnished by MSFC to MSC during prelaunch for each Apollo-Saturn launch.

b. Meteorological Data Tape evaluation is furnished by MSFC to MSC after each Apollo-Saturn launch.

c. Over-all cooperation is constantly maintained with MSC in sharing of computer time.

d. There is a considerable exchange of documentation.

e. The Centers confer often as to how astronaut experiences can be used in improving programs.

f. At the request of MSFC, MSC loaned MSFC a Gemini hand controller to see if it could be used as the controller for the ATM.

g. MSC has offered to let an MSFC contractor (Hamilton Standard) use their vacuum test facility to run test of orbital nondestructive test equipment. The facilities are not available at MSFC nor the contractor's facility.

h. MSC provides MSFC with space suits, back packs, etc., and the training of MSFC and contractor personnel in the use of the equipment.

i. MSC has purchased 29 each 100-pound thrust Gemini orbital attitude maneuvering systems (OAMS) motors for MSFC.

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Dr. ~~von~~ Braun, DIR

DATE NOV 30 1966

FROM Director, Operations Management Office, R-OM-DIR

SUBJECT MSFC Centrifuge Gondola Testing for MSC

In response to your question (see Enclosure 1) on why we should not inform MSF of the gondola testing ME Laboratory did for MSC, we have contacted Mr. Bill Davidson (MSFC liaison at MSC) and Mr. Walt Crumpton (ME Laboratory) and it is recommended that we do not notify Headquarters by memorandum or unilaterally send them a copy of the test report. The feeling is that damage to MSFC/MSC relationships could far outweigh the credit with MSF if we independently inform them of a small (under \$100,000) job we did for MSC.

If you would like to take occasion to mention orally the cooperation between MSFC and MSC, emphasizing the MSFC role, I can prepare for your use a summary on the various tasks we are doing for MSC. Mr. Kuers has been apprised of this memorandum.

1 Enc:
As stated

W. H. McCarty
for W. S. Fellows

Please do



*direct
9/13/13*

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Dr. von Braun, DIR

DATE OCT 13 1966

FROM Director, Operations Management Office, R-OM-DIR

SUBJECT MSFC Centrifuge Gondola Testing for MSC

In response to your questions to me about NOTES 10/3/66 KUERS, attached, we were provided \$41,000 by MSC for the gondola testing. It is extremely doubtful if NASA Headquarters knows that MSFC is doing this work for MSC and there are no present plans for informing them. When the tests are completed, a test report will be provided to MSC, Mr. Elree Wilkinson, with no other planned distribution. I have apprised Mr. Kuers of this memorandum.

W. S. Fellows
W. S. Fellows

1 Enc:
As stated

cc:
R-DIR, Mr. Cook
R-ME-DIR, Mr. Kuers



*Any reason why
it shouldn't? B10/17*

Enc. 1

10/3/66

B 13/8

MSFC Centrifuge Gondola Testing for MSC: Following a request from MSC, the Manufacturing Engineering Laboratory is presently concluding an exhaustive pressurization test program designed to determine the "man worthiness" of the MSC human centrifuge gondola caps. The test program was initially delayed for about three weeks owing to the need for repairs on the bottom half cap. The damage occurred either before shipment to MSFC or possibly in shipment. For the test, the gondola was put inside our autoclave. The test consisted of three complete pressurization cycles providing about 24 psi pressure differential across the gondola walls. The interior of the gondola was evacuated to one psia and 25 psia was applied externally by pressurizing the autoclave. Twenty-seven channels of strain information and 20 channels of structure deflection data were recorded; two pressure recording channels were used, and two closed circuit TV systems monitored the dynamic response of the gondola to the "ramp" pressure increases during the test. The instrumentation was developed and applied by R-ME. Mr. Elree Wilkinson of MSC represented Houston during the test program. There is every indication of a completely successful test article and test program.

Scott Fellows

Do we get reimbursed by MSC for this work?
Do we get any "credit" for it with MSC, Hq.?

B

M. Gorman
NOTES 10/3/66 MAUS
10/3/66 *B 10/3*

MSF POP 66-3 - The official headquarters mark for POP 66-3 has been received. The obligations guidelines figures were the same as those in the advance copy received two weeks ago with the exception of \$2.0M additional in Supporting Development. We also received cost and uncosted guidelines for major contractors for FY-67. The submission date for the completed MSF POP is October 7. ✓

ADMINISTRATIVE OPERATIONS - We have been advised by Jerry Heater, NASA Headquarters, that we should develop our FY-68 AO Budget on the following unofficial guidelines currently being contemplated in Headquarters:

- A. In FY 67 our ceiling is \$129.969M including Class Act pay raise.
- B. In FY 68 our ceiling is \$133.063M with distribution as follows:

| | |
|---|--------------|
| 1. FY 67 dollar guidelines | \$129.969M |
| 2. Increase in support contracts for anticipated wage and personal benefits | .694M |
| 3. Increase in Civil Service personnel service costs | 1.000M |
| 4. Third generation equipment rental overlap | 1.400M |
| Total | \$133.063M ✓ |

H.M.
Should the FY 67 dollar ceiling above depicted become our official ceiling, reductions will be necessary from our present planning level of \$130.651M. ✓

When quoted out of context, this text can be damaging. Please put it under wraps, somehow.
ECONOMIC IMPACT STUDY - The first phase of our on-going economic impact study has been completed and reviewed by Mr. Koenig of NASA Headquarters. As was generally expected, the phase-down in MSFC's operation as Apollo is completed will have an extensive effect upon the Huntsville work force and area economy. A similar effect will be felt by MTF and its surrounding area while New Orleans, on the other hand, with its extensive metropolitan area and diversified economy, will feel little effect as the Michoud Operation phases down. The New Orleans area is singularly different from Huntsville and MTF in that it was experiencing a decided boom in its economy before the activation of Michoud. ✓

10/3/66
W. K. G. G. G.

NOTES 10/3/66 BALCH

B10/8

10/3 XS

S-II-1 Testing - Repair of LH₂ feed duct connections is complete and LH₂ tank has been closed; however, grinding and polishing of external welds around connections to prevent possible cracking is constraining pressurization of LH₂ tank, and replacement of insulation. In LOX tank, replacement of plug seals in the aft facing sheet of the common bulkhead is complete, and LOX tank has been closed. Earliest dates for LH₂/LN₂ tanking and first firing are now 10/10/66 and 10/16/66, respectively. S-II-1 Test Readiness Review was held on 9/26/66, and all open items are being resolved. ✓

S-IC Test Stand - Program review was held on 9/28/66. No facility constraints are anticipated against checkouts to be performed by Boeing. Installation of test spiders for determining structural acceptability of hold-down arms is expected to begin the second week in October. S-IC-T stage is still expected to arrive at MTF the latter part of October and to be installed in the B-2 stand the first part of December. ✓

S-II Test Stand A-1 - Program review was held on 9/28/66. Target date for completing activation of the A-1 stand is now 1/27/67. However, meeting this date is contingent upon the successful resolution of several current problems, including the continued slippage of GSE and mod kit deliveries. ✓

MTF LOX Barges - All four barges that were used to transport LOX to KSC have now been returned. Two are back in service and one needs only minor repairs. Extensive repairs are required on Barge No. 5, the one which was severely damaged in the collision with the swing bridge on 9/16/66. The time required for these repairs has not been determined, but no stage test schedules are expected to be impacted. ✓

United Givers Fund Drive - Kick-off meeting for MTF Combined Agencies Campaign was held on 9/27/66. MTF will be participating in separate United Fund drives for Hancock, Harrison, and South Pearl River Counties, Mississippi, and for Greater New Orleans, Louisiana. Site-wide goal is \$65,000.00. ✓

Mississippi Coast Association of Federal Administrators - MTF Site Manager became president of this group at a meeting on 9/28/66, replacing the Commander of the Navy Gulfport Construction Battalion Center, who has been transferred. ✓

10/3/66

B10/8

MAPPING AND SURVEY SYSTEM - AS-210 MISSION: The possibility of mounting three of the "EO-0" experiments on the Rack for the AS-210 Mission is under study. The AS-210 Mission will be discussed by MSC with Dr. Mueller on Wednesday, October 5, 1966, and at that time a decision will be made as to whether or not the Rack will be retained in orbit with the payload module during the AS-210 Mission. ✓

TEST PHILOSOPHY: Met with Bob Hathaway, Ball Bros., on their test philosophy as experienced on the OSO program. Ball Bros. conducts a compatibility test upon receipt of experiment (electrical and mechanical interface). The spacecraft has been run through an acceptance test prior to delivery of experiments. After integration of experiments a thermal vacuum test is run on the complete observatory. All systems are operated including experiments. Principal Investigators' or their contractors are in attendance during all operations with the experiments. Vibration tests are also run on the flight unit, to lower level than Qual levels (expected flight levels). ✓

PAYLOAD INTEGRATION CONTRACTORS' "COMBINED MISSION" STUDIES: Martin and Lockheed presented the results of their study of the 209/10/11/12/13 combined missions this week. We reviewed with both contractors the details of our in-house study. One of the most significant things is that both prepared an unmanned 209 launch going into a high enough orbit to sustain a one-year lifetime. ✓

TASK ASSIGNMENT ON ORBITAL WORKSHOP: Martin has delivered a sample task plan and project outline for the Orbital Workshop. They will complete this plan which will include things which need to be done, such as, identify the responsible elements (MSFC, MSC, DAC, McD, etc.) and provide a functional flow for implementation of the tasks. Discussions are continuing with P&VE and Bill Ferguson to finalize the detailed assignments to Martin on Orbital Workshop. ✓

AIRLOCK MANAGEMENT MEETING: The first monthly Airlock Management Meeting will be conducted by MSC at McDonnell, St. Louis, Mo. Mr. W. Faulkner (R&D) and Mr. Ferguson will attend this meeting. ✓

Shop
See
how im-
portant
a clean
vacuum
is!
B

NOTES 10-3-66 BROWN

B
10/15

9/27/10/3
J-2 ENGINE There was a successful 10 second test at AEDC, Friday, 9-30-66. This test was run under similar conditions to those of the 9-24-66, test: heated LOX dome purge, purge diffuser and heat lamps in thrust chamber. The only change to the test procedure was a 100° increase in thrust chamber pre-conditioning temperature. MSFC, AEDC, and Rocketdyne are continuing efforts to define a test procedure compatible with the environment of the test cell. ✓

H-1 ENGINE The gas generator from Engine H-7063, Vehicle SA-204, has been replaced on the engine at KSC following repair at Neosho. Functional checkout of this component was satisfactorily completed last week.

The H-1 Quarterly Program Review was conducted at Rocketdyne-Canoga last week. ✓

2 RM1?
B
C-1 ENGINE Nozzle-up testing of C-1 engine was completed (at MSC) on 9-26-66. Tests on both low and high dribble volume vortex injector engine configurations were conducted under what are considered severe environment and operating conditions. Although enough testing was not accomplished to draw any firm conclusion at this time, it is of significance that the testing was completed without encountering any hardware damage as a result of a "ZOT" (oxidizer manifold explosion) or high magnitude ignition spike. ✓

Apparently not feasible B
F-1 ENGINE A non-routine F-1 engine static test performed at MSFC on 9-29-66, resulted in extensive damage to the engine and minor test stand damage after an explosion and fire occurred within the turbopump. The test objective was to determine the feasibility of an emergency shutdown technique involving the vehicle "prevalves" installed in the LOX ducts. The malfunction occurred in the LOX section of the pump when pre valve shutdown was initiated after six seconds of mainstage. The pre valve had closed approximately 90% and the pump was apparently in deep cavitation at the time of the incident. The engine, S/N F-1002, was the second ground test F-1 engine delivered to the government, however, the turbopump assembly had been replaced with an FRT type and had approximately 750 seconds of accrued run time. Analysis of data and evaluation of hardware is in progress. Preliminary results will be available in approximately one week. ✓

The eroded baffle section from the initial injector used in the QUAL Program has been removed and replaced. Five tests for a total of 530 seconds have been accumulated. At about 50 milliseconds, after 90% chamber pressure, instability occurred which damped in 18 milliseconds. The fifth test was for a rated full duration run time without additional incidents of instability. One suspected trigger is the plugging of the tunnel area between the rings and radial baffles which were left after the replacement of the eroded baffle. These areas are open on the deliverable injectors. The injector will be returned to Canoga Park for reinspection in an attempt to isolate the exact cause of the last self-trigger. ✓

NOTES 10/3/66 CONSTAN

HURRICANE INEZ THREAT

5/8
10/3

B10/8

NASA called a meeting of representatives of Michoud prime contractors on Friday, September 30 to discuss what hurricane protection would be put into effect over this weekend. If the hurricane continues on a westerly course, the 72-hour period would begin sometime Saturday, October 1. The Director of New Orleans Civil Defense was advised that NASA management would lend assistance to the city in the event Hurricane Inez strikes this area. ✓

NOTES 10/3/66 FELLOWS

B10/8

10/3/66

1. Apollo Lunar Landing Symposium: In coordination with Jim Shepherd, I am working out mutually agreeable arrangements with Mr. O. E. Maynard, Manned Spacecraft Center, for MSC speakers to come to Marshall and present selected subjects from the Apollo Lunar Landing Mission Symposium held in Houston on June 25-27, 1966. The symposium will be held in the Morris Auditorium, and I told Maynard to be prepared for a full attendance. The selected date will probably be early in November. ✓
2. Visit by U. S. Navy Personnel: On Tuesday, September 27, Captain D. G. Wilson and Lt. Commander Russell Drew visited Marshall on a stop-over during a Navy proficiency flight out of Washington, D. C. Their visit was coordinated through Bob Freitag. The visit was for orientation, since this was the first time either had been to MSFC. We were particularly interested in their visit, however, because Captain Wilson is an engineer and electronics specialist now assigned in the Naval Materiel Office, and is scheduled to go to the Department of Defense (DDR&E) in October and cover the areas of reconnaissance and intelligence. He will be directly involved in such things as the MOL Program. Commander Drew has a Ph. D. in science (physics, oceanography, and geophysics) and is currently on duty in the Office of Science and Technology in the White House, where he works for Dr. Nick Golovin and Dr. Colin McLeod. The visitors talked with Dr. Stuhlinger, Hal Becker and others in the Advanced Systems Office, Bill Ferguson and Rod Stewart in S/AA, and then toured Quality, Test, and ME, in that order, where they talked with Messrs. Trott, Tessman, and Kuers, respectively. Commander Drew was particularly well informed on the AAP activities and discussed, in depth, various aspects of our AAP organizational approach, the ATM, ATM experiments, the S-IVB Workshop, etc. Captain Wilson commented that he didn't think the MOL Program information was getting to the lower NASA levels (he seemed well aware of the politics) but he would see what he could do to improve communication. The visitors seemed to be extremely impressed with the capabilities of the facilities they visited and said they hoped to be able to return soon and spend more time finding out what we do. In my opinion, they left with a very favorable impression of MSFC. ✓
3. IO/R&DO Program Support Agreement (PSA): Following extensive coordination between IO and R&DO elements, General O'Connor and Mr. Weidner have signed a PSA which includes general provisions and a broad scope of work for R&DO support to IO in managing the IB and V programs. ✓
4. Neutral Buoyancy System (NBS): We have asked the Facilities and Design Office to study the feasibility of installing the NBS in an existing building (instead of a new enclosure as originally planned). Then, the most economical arrangement will be recommended to Center management. ✓

Scott F.

→ Can't see it? B

Frank Williams
FYI, too

NOTES 10/3/66 GEISSLER

B10/8

1. Mars Surface Sample and Return Probe (MSSR): During the recent Planetary JAG exercise, it was suggested that Manned Mars Flyby Missions would be more attractive if a technique could be devised whereby a Martian surface sample could be obtained. Bellcomm proposed a probe that upon approaching Mars, would be launched from the manned flyby spacecraft, descend to the Martian surface, pick up a surface sample, and then rendezvous with the manned spacecraft. Bellcomm worked on this probe idea for NASA Headquarters for about six months. Recently, Headquarters and MSC asked NAA to come up with a conceptual design for this probe. NAA conducted a concentrated study effort in three weeks, presented the results to Headquarters on September 20, and will submit an unsolicited proposal for further study about November 1. The Advanced Studies Office of Aero-Astrodynamics Laboratory, is coordinating a study effort to provide more insight into some of the major problem areas. RP, ASTR, and P&VE are participating.

2. Control Theory Symposium and NASA Intercenter Meeting on Control System Theory: The Control Theory Symposium, held at MSFC September 19-21, sponsored jointly by Aero-Astrodynamics, Astrionics, and Computation Laboratory, was chaired by Mr. James C. Blair of our Astrodynamics and Guidance Theory Division. In the opening remarks, I stressed Marshall's interests in advanced control concepts in connection with AAP missions. 140 people from NASA Centers, industry, and educational institutions attended, twenty three technical papers were presented, and subsequent discussions and comments indicated that a beneficial information exchange was provided by the symposium.

The second NASA Intercenter Meeting on Control System Theory was held here September 22-23, chaired by Dr. John H. George of our Astrodynamics and Guidance Theory Division. The meeting formally covered many topics in control theory currently under consideration at NASA Centers. Various center representatives gave examples of problems arising in their current assignments which indicated the need for better methods of applying modern theory to practical problems. The meeting indicated that we are one of the stronger centers participating in the control theory area, along with Ames and Langley. A special session for NASA grantholders in the control theory area, linking the above two meetings, was held at the request of Mr. Carl Janow, OART - Headquarters, who is funding these grantholders. Papers presented and resultant comments, gave some idea of the interests of this particular funding group.

3. Results of September 19 PRB Meeting: The results, on the question of panel continuation for SAA activities at the PRB Meeting held in Washington September 19, 1966, were very disappointing. The panels all made recommendations on the necessity of moving out on work for 209 - 212 vehicles and also that the panel structure be maintained for future work on SAA interfaces. After hearing all the panels' recommendations, General Phillips indicated that he would recommend to Dr. Mueller against continuation of panels for SAA activities. We feel that further discussion on the role of panels in support of MPTF activities is required. I agree B

found to be suitable for life. [Drop a sampler into the Sahara desert and you'll conclude that there's no life on earth!!] B 10/8

E.G.
I think it is pretty obvious that large portions of Mars are barren. If there are some forms of life, it is probably limited to locations that offer special advantages. For instance, volcanic activities resulting in locally increased temperatures plus water freed by eruptions.
Conclusion: Surface samplers should be useful only if they make a pinpoint landing at a spot previously (via Voyager?) found to be suitable for life.

I heard just the opposite. Why should Phillips, who is not even responsible for the SAA program, want to abolish the panels and the panels feel it is necessary to continue them?? B

Eberhard Rees

URGENT

10/3/66

B 10/8

1. S-IC-2 STAGE CHECKOUT: Checkout problems on the S-IC-2 stage are very similar to those we encountered on S-IC-1. Part shortages, non-availability of replacement hardware, and outstanding E.O.'s hamper the checkout process. We still anticipate completion of checkout within the required delivery date of November 5, 1966. However, efforts to expeditiously complete outstanding work must receive top priority from all organizations concerned. ✓
2. S-II AUTOMATED CHECKOUT: During a portion of the time that repair work was in progress on the S-II-1 stage at MTF, automatic checkout equipment (ACE) was brought "on line" to demonstrate its operability and to functionally test some portions of the stage. The Electrical Power, Propellant Management, Propellant Dispersion, Engine, Separation, and Switch Selector systems tests have been performed successfully to date. Completion of these tests is a notable achievement considering that this was the first demonstration of the ACE at MTF with a flight stage, and new personnel and software were involved. Other automatic tests will be performed before static firing if time permits. ✓

10/3/66

B 10/8

1. ST124-M STATUS:

Unit SN-8, assigned to AS-204, was returned from KSC on 9/28. The accelerometer encoder mirrors were potted that day and a retest of the accelerometer was conducted. Recertification of the system will be complete on 10/3, and the system will be returned to KSC on the evening of 10/3. ✓

It is planned for the plane to return from KSC with the ST124-M assigned to AS-501 on 10/4. The system will receive modifications to the accelerometer stop to reduce susceptibility to vibration during first seconds of flight plus the mirror modifications. It will then be returned to KSC so as not to interfere with launch schedules for AS-501. ✓

Mr. Kroeger visited Eclipse-Pioneer the week of 9/26. Among items discussed with Mr. Bevins (General Manager) and his department heads was the need of improved quality control in the optical encoder area. Mr. Bevins stated that E-P will place a quality representative in the vendors plant (Dynamics Research Corp.). In addition E-P will establish an encoder production capability as a backup. ✓

2. PHASE-OVER OF TELEMETRY FREQUENCIES FROM VHF TO UHF:

Attached is a copy of a recent letter* from Dr. Seamans to DOD outlining the NASA position on this subject.

In reviewing our UHF ("S" & "L" Band) endeavors we find that in no case has a contractor met his previously agreed to delivery schedule. In each instance schedule slippage was due to technical problems. To date we have developed one UHF transmitter source which, at best, is marginal because of difficulty in reproducing the design.

We are presently behind in our delivery of GFE "S"-Band transmitters to IBM for installation in the five-hundred series instrument units.

We are conducting a study of ways and means of overcoming problems experienced to date and will submit our recommendations in the near future. ✓

* Enclosed with copy of notes to DIR and R-DIR only.

NOTES HEIMBURG 10/3/66

10/3 9/8

B 10/8

S-IC

The S-IC-3 stage arrived at the docks on October 1, 1966, at approximately 3 p.m. The stage will be unloaded from the barge and installed in the test stand on October 3, 1966. ✓

F-1 Lox Pump Explosion

Tests TWF-074 and TWF-075 were conducted on the Static Test Tower West (STTW) F-1 Test Facility on September 27 and 29, 1966, respectively, with F-1 Engine S/N F-1002-3. Test TWF-074 was conducted to determine baseline performance for preclude shutdown tests and to check out the engine and facility systems. Test FW-075 was the first of a series to investigate possible preclude control system failures and emergency engine shutdown with precludes. Cutoff was given after 6.7 seconds of mainstage duration by the thrust OK system after the lox preclude had been signaled to close. An explosion occurred in the area of the engine lox turbopump causing extensive damage to the engine and minor damage to the adjacent facility area. The test data are being analyzed to determine the mode of failure. ✓

S-IVB (SACTO)

Pre-static testing of the S-IVB-207 is scheduled for October 12, 1966. ✓

S-II (MTF)

The fuel tanks were closed on Sunday p.m. The lox tank has been closed and is being purged. The B0-10 electrical checkout and partial components leak check are scheduled to start October 3, 1966. The lox fill and drain valve was replaced. ✓

GSE

Meeting held at KSC on 9/30/66 with R-TEST, R-P&VE, IO and KSC agreeing on test and delivery schedule of Saturn V Service Arm and Tail Mast for SA-502. ✓

Also reached agreement with KSC on phase out of 26 Boeing-LVO personnel which will minimize effect on test program. ✓

NOTES 10/3/66 JAMES

B 10/5

10/3 9/5

SATURN IB BREADBOARD FACILITY: Both Mr. Fichtner's and CCSD's breadboard people have done an outstanding job in recent months. ✓ Their continued efforts resulted in our achieving an average of 14.1% operational hours per day last week. This is the highest average we have yet achieved. ✓

EDS TEST PROGRAM: We have experienced some slippage in the EDS test program but I believe that we will complete qualification of all items prior to AS-204 launching. It is questionable if we will complete reliability testing prior to launch. ✓ LB1 I signed on the dotted line! B

FOLLOW-ON PROCUREMENT OF LONG LEADTIME ITEMS: We expect to complete negotiations for the long leadtime buy of S-IB Stage items this week, except for establishing cost and instrumentation requirements. The S-IVB is a little ahead of the S-IB procurement in negotiations. The contract value has been agreed to be \$5,969,720.00. A supplemental agreement is being prepared for signature by DAC and subsequent forwarding to NASA Headquarters for approval to complete this procurement action. ✓

DESIGN CERTIFICATION REVIEW: A large number of action items resulted from the DCR in Washington last week. Memoranda have gone out to offices involved asking for the basic information by 21 October. This information will go into the records to close the actions. Now Dr. Mueller has called for a status meeting this Friday on all actions so we are attempting to get as much information as possible this week. ✓

NOTES 10-3-66 JOHNSON

10/3 96.

B 10/2

Advanced Launch Vehicle Structures and Fabrication Techniques - OART representatives (Messrs. Rosche and Gilstad) visited MSFC on 9-28-66 for conferences with (a) Dr. Lucas/Dr. Mrazek at R-P&VE; (b) Mr. Kuers/Dr. Siebel et al at R-ME and (c) Messrs. Becker/Spears/Fellenz at R-AS. Discussed were advanced launch vehicle structure and advanced fabrication techniques, with exploratory discussions on a "lead Center" concept for specific technology areas such as advanced launch vehicle structures. R-EO personnel participated in all conferences. ✓

Research Achievement Review on 9-29-66 - The review dealing with Quality and Reliability Assurance Research, covering the infrared fast scanning microscope and similar development in inspection and testing, was extremely well attended in terms of the number of organizations represented. NASA attendees included 21 persons from HQ's and other Centers (Goddard, JPL, Wallops, Langley, Lewis, Ames, KSC, and MSC). ✓

X-Ray Mapping Experiment (S-027) - The contract was executed on 9-30-66, with the University of Wisconsin. ✓

10/3/66

B 10/8

MSFC Centrifuge Gondola Testing for MSC: Following a request from MSC, the Manufacturing Engineering Laboratory is presently concluding an exhaustive pressurization test program designed to determine the "man worthiness" of the MSC human centrifuge gondola caps. The test program was initially delayed for about three weeks owing to the need for repairs on the bottom half cap. The damage occurred either before shipment to MSFC or possibly in shipment. For the test, the gondola was put inside our autoclave. The test consisted of three complete pressurization cycles providing about 24 psi pressure differential across the gondola walls. The interior of the gondola was evacuated to one psia and 25 psia was applied externally by pressurizing the autoclave. Twenty-seven channels of strain information and 20 channels of structure deflection data were recorded; two pressure recording channels were used, and two closed circuit TV systems monitored the dynamic response of the gondola to the "ramp" pressure increases during the test. The instrumentation was developed and applied by R-ME. Mr. Elree Wilkinson of MSC represented Houston during the test program. There is every indication of a completely successful test article and test program.

Scott Fellows

Do we get reimbursed by MSC for this work?
Do we get any "credit" for it with MSF, Hg.?

B

NOTES 10-3-66 LUCAS

B 10/3

1. FLIGHT EXPERIMENT #9 - Our lubrication experiment (#9) has been deleted from AS-209 for weight consideration. Our next possibility is AS-213 or AS-216. In compliance with Dr. Leo Werner's (OMSF) suggestion, we are modifying the experiment to make it directly applicable to the needs of follow-on ATM flights, since current technology limits the control accuracy of ATM. ✓

2. HIGH PRESSURE LH₂ PUMP - A successful 17 second test of the high pressure LH₂ pump being developed by Pratt and Whitney Aircraft was conducted on September 22, 1966. At the peak pump speed of 36,000 rpm the pressure developed was 4230 psi at a flow-rate of 10,700 gpm. A non-synchronous hydro-mechanical instability which caused bearing failure had previously limited stable operation to under 30,000 rpm. This pump was built with high spring rate roller bearings to alleviate this problem. Data evaluation and post-test teardown inspection have revealed no performance, stability or mechanical problems. ✓

3. NUCLEAR GROUND TEST MODULE (NGTM) - A brief NGTM design status review session was held recently. The overall participation and progress in the program definition and design is good. Structural, propulsion, and systems requirements in the stage-to-engine interface area will have to remain flexible pending NERVA engine definition. The overall aspect and impact of the currently proposed "O" NPSH NERVA pump concept is under investigation in-house. The "O" NPSH pump concept requires a 36-inch diameter LH₂ valve, a new developmental item and possibly beyond current state-of-art. The development schedule for the "O" NPSH pump is five years, several years beyond planned in-house cold flow tests. Presently, depending upon results from in-house studies, plans are to propose a more conventional feed system concept. ✓

4. FILM FROM S-IB-203 - You recently expressed interest in viewing T.V. coverage, internal to the H₂ tank, of the S-IB-203 flight. You have seen film which verifies the Apollo system (one orbit) but have not seen the film of bonus experiments of the remaining two orbits. A tape replay of the flight can be arranged for your convenience after October 10, 1966. The film duration is 25 minutes. ✓

5. QUALIFICATION OF GIMBAL FLIGHT SUPPLY LINE - The gimbal system flight supply line, P/N R11620-3, has successfully completed qualification tests. This line, which is a flexible configuration manufactured by the Resistoflex Corporation, was qualified as a back-up for the Boeing flight supply duct, 60B83107-1. Boeing has been directed to re-design their duct to incorporate more flexibility in order to reduce the loads imposed on the F-1 engine fuel duct. Since the MSFC developed flexible line is now qualified, it appears that Boeing will accept this design. If so, it will be the third line in the back-up program that has been incorporated into the flight gimbal system. ✓

Bill L.

Why "O"
NPSH?

We must
pressurize
tank for
structural
reasons
anyhow,
just to
handle the
NERVA's
thrust.

B

B.L.

Please
arrange with
Bonnie

10/3/66

B 10/8

MSF POP 66-3 - The official headquarters mark for POP 66-3 has been received. The obligations guidelines figures were the same as those in the advance copy received two weeks ago with the exception of \$2.0M additional in Supporting Development. We also received cost and uncoded guidelines for major contractors for FY-67. The submission date for the completed MSF POP is October 7. ✓

ADMINISTRATIVE OPERATIONS - We have been advised by Jerry Heater, NASA Headquarters, that we should develop our FY-68 AO Budget on the following unofficial guidelines currently being contemplated in Headquarters:

- A. In FY 67 our ceiling is \$129.969M including Class Act pay raise.
- B. In FY 68 our ceiling is \$133.063M with distribution as follows:

| | |
|---|--------------|
| 1. FY 67 dollar guidelines | \$129.969M |
| 2. Increase in support contracts for anticipated wage and personal benefits | .694M |
| 3. Increase in Civil Service personnel service costs | 1.000M |
| 4. Third generation equipment rental overlap | 1.400M |
| Total | \$133.063M ✓ |

Should the FY 67 dollar ceiling above depicted become our official ceiling, reductions will be necessary from our present planning level of \$130.651M. ✓

ECONOMIC IMPACT STUDY - The first phase of our on-going economic impact study has been completed and reviewed by Mr. Koenig of NASA Headquarters. As was generally expected, the phase-down in MSFC's operation as Apollo is completed will have an extensive effect upon the Huntsville work force and area economy. A similar effect will be felt by MTF and its surrounding area while New Orleans, on the other hand, with its extensive metropolitan area and diversified economy, will feel little effect as the Michoud Operation phases down. The New Orleans area is singularly different from Huntsville and MTF in that it was experiencing a decided boom in its economy before the activation of Michoud. ✓

H.M.

When quoted out of context, this text can be damaging.

Please put it under wraps, somehow

B

NOTES 10/3/66 RICHARD

B
10/2

10/29/66

Technical Assessment Presentation: We plan to present to General O'Connor a status report on the Saturn "soft spot" survey we've been making in R&D Operations. This briefing is set for Oct. 19. We plan to discuss some pressing items and review the types of problems we have had so far. We will propose a method of handling these and future "soft spot" items so that each one can be treated as it is defined. ✓

NOTES 10/3/66 RUDOLPH

10/3 9/2

B
10/8

Negative Report

NOTES 10/3/66 SPEER

B10/8

10/3 JLB

1. LIEF/HOSC ADDITION: The design of the HOSC addition was completed by the MSFC Facilities and Design Office on 9/27/66 as scheduled. The accelerated schedule for contract award and construction was reviewed on 9/29/66. It is expected that the contract award will be made by the end of this month with a partial beneficial occupancy date of about March 5th. The projected completion date is March 20. Under the conditions of this schedule, contingency activation plans will be made for only partial use of the new area for AS-501. We have been assured that every effort will be made to expedite the construction and activation of the facility. ✓
2. LAUNCH WIND EVALUATION: After some initial difficulties, KSC has agreed to study and pursue our proposed real time launch wind evaluation scheme which requires raw wind data transmission from KSC through LIEF. A meeting with KSC is scheduled for 10/11/66 to work out the technical details. ✓
3. ASTRONAUT TRAINING: Our Flight Control Office at MSC (C. Casey) is preparing a briefing for the AS-204 Crew on the L/V flight control aspects of the mission. This briefing was originally scheduled to be given by Mr. Casey at MSC, however it has now been agreed to combine this briefing with the IB Program Office briefing tentatively scheduled for October 26 at KSC. ✓

10/3 98.

B 10/8

1. ATM PRESENTATION TO PSAC: Members of OSSA, OMSF, Bellcomm, and MSFC met at PSAC to present details of the ATM program to the Astronomy Subcommittee. Questions on management, scheduling, engineering, science, and operation were deep-probing and inquisitive. Although the attitude of the Subcommittee was friendly and constructive, it became evident that the Subcommittee members will follow the ATM program with a critical mind; they will be led by the question: will this approach, under the given circumstances, do the best possible service to astronomy? Major areas of concern include the following: configuration of spacecraft; pointing accuracies of telescopes; functions of astronaut (s); environmental contamination; schedules; and the roles of the PI's during flight. ✓

This matter will be discussed in more detail between you and members of IO, Astrionics, and RPL before the Mueller presentation (Oct. 7). ✓

2. PRESENT ACTIVITIES OF ATM PROJECT SCIENTIST: ATM problem areas which will require substantial contributions from the project scientist and the experiment scientists in RPL include pointing and alignment accuracy requirements of telescopes; display requirements of experiments in LM; simultaneous operation of experiments during a flare; functions of astronauts; contamination of environment; reference system for locations on solar disc; and others. Much uncertainty exists in all these areas. We are working closely with the PI's and Ball Brothers, and with Astrionics and IO, and we expect that mutually acceptable base lines can be established soon in all these areas. ✓

Lude
Richard
FYI
B 10/8

NOTES 10/3/66 WILLIAMS

10/3 G.B.

B
10/8

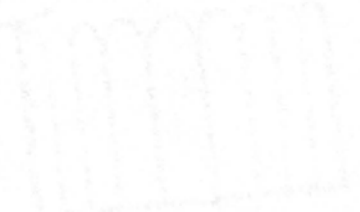
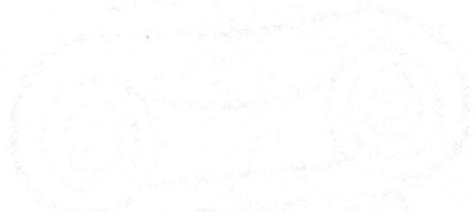
1. Saturn Improvement Studies: Final reviews on FY 65 Saturn IV and Saturn V Improvement Studies are being held October 3 - 5. Detailed reviews will be held on October 3 and 4; an "Executive Summary" will be given on Wednesday morning (October 5), covering all Saturn IB and Saturn V studies, plus the corresponding KSC studies. ✓

2. MIMOSA Day: The second and final Interim Presentation by Lockheed (LMSC) on the MIMOSA Study will be held on Thursday, October 27, 1966, at 9:00 a.m. in the Center Conference Room, 10th floor, Building 4200. This presentation will concentrate on the results of the study's exploration program analysis efforts leading to alternative program synthesis and equipment specification. This meeting should highlight MIMOSA's ability to provide an understanding of program options and their implications. ✓

✓ F.B.
What was that again?

B
10/8

Oct 10, 1966



11/11

11-10-66

11-10-66

| MSFC ROUTING SLIP | | | | |
|-------------------|------------------|------------------------|-------|---|
| | CODE | NAME | INIT. | <input type="checkbox"/> ACTION <input type="checkbox"/> INFORMATION |
| 1 | PR-CH | Mr. Buckner | | |
| 2 | DEP-A | Mr. Thumby | | |
| 3 | | DM | | |
| 4 | | | | |

REMARKS

TBC means the Boeing Company - I-CO is now negotiating a conversion to CP/F - This note is evidently a report on part of these proceedings.



JWZ
10/19

| | | |
|------|------|------|
| CODE | NAME | DATE |
|------|------|------|

MSFC - Form 183 (Rev. February 1961)

Mr. Buckner
What's this all about?
NOTES 10/10/66 GEISSLER *Thompson*
Newby

1. Crossed-Beam Weather Watch: As a result of your suggestion, we are trying to obtain support for environmental applications of crossed-beam technology from agencies other than NASA. Dr. J. P. Kuettner, chief scientist of National Environmental Satellite Center (N.E.S.C.), E.S.S.A. has included the crossed-beam method in his final report on desirable remote sensing methods. Dr. Johnson, Chief of N.E.S.C. is going to officially contact MSFC on this subject. As a result of a presentation to the Institute for Telecommunication Sciences and Aeronomy, E.S.S.A. on September 26, 1966, MSFC will receive a communication from Dr. F. Roach, assistant director, recommending crossed-beam techniques for aeronomy and ionospheric studies. Another presentation was given to the faculty of Colorado State University (C.S.U.) on September 29, at their request. Professor F. Reiter, head of Atmospheric Science, C.S.U., and chairman of the Scientific Advisory Panel to the National Committee on Clear Air Turbulence, is trying to include crossed-beam experiments in the final report of the committee, which evaluates R&D proposals on clear air turbulence for the next five fiscal years.

2. TBC Systems Incentive Contract: We have agreed to develop an incentive plan for TBC Systems Incentive Contract which will separate the schedule requirement from the performance requirement. This measure was taken to end the deadlock on negotiations. The basic concept is to establish a schedule incentive for each of the 487 documents to be delivered following November 1, 1966. The performance requirements will remain basically as they have been with the incentive units applied only on selected documents. 15 - 20% of the existing performance incentive units will be used for this new schedule concept.

3. World-Wide Cloud Coverage Statistics: Our Aerospace Environment Division is currently evaluating eleven proposals from a recent RFQ for studies on World-Wide Cloud Coverage Statistics to be used in future AAP mission analyses. ESSA's activities in this area will not satisfy our needs. Responses came from a good cross-section of research and aerospace organizations. The aerospace organizations, in particular, strongly supported the project for their internal and other mission analysis applications. We plan to incorporate inputs from Headquarters and other NASA Centers in order to produce a well coordinated and useful set of statistics. Negotiations with the selected contractor should start soon.

Jim Locke
What is this?
OK
WKly notes
10/10

NOTES 10/10/66 BALCH

B 10/18

10/10/66

S-II-1 Testing - LH₂/LN₂ tanking is scheduled for today, and the only remaining constraint is the LH₂ tank insulation verification leak test, which is expected to be completed by about 2 p.m. First firing is still set for 10/16/66. ✓

Preliminary results of flow tests conducted at Rocketdyne on the type of foil seal installed in LH₂ tank of S-II-1 stage indicate no problems with this type of seal. ✓

LN₂ Procurement - Air Reduction's LN₂/LOX plant at New Orleans went out of production on 9/30/66 due to mechanical failure of a prime compressor in the cascade system. A review of minimum LN₂ requirements through S-II tanking test was prepared and an emergency buy for 700 tons of LN₂ was initiated on 10/4/66. No impact on S-II tanking or first firing is expected. ✓

Emergency Operations - Implementation of MTF emergency plans in connection with Hurricane "Inez" was carried out successfully. An emergency control center was established, with 24-hour per day, 7-day per week coverage, and on two occasions, 10/3/66 and again on 10/5/66. Hurricane Condition IV was established. ✓

Labor Relations - The International Association of Machinists and Aerospace Workers (IAMAW) has strongly protested recent action which will result in operation of a heating plant by non-union GE employees instead of GE subcontractor employees who are members of IAMAW. Every effort is being made to resolve the problem, but there remains at this time a strong possibility that informational picketing will be conducted by the IAMAW. ✓

"Aviation Week" Special Report on MTF - A writer from "Aviation Week" is to be at MTF this week to get material for a story on MTF. ✓

NOTES 10/10/66 BELEW

10/10 JWS

B 10/18

ORBITAL WORKSHOP:

The first monthly management meeting on the Airlock contract was held at McDonnell 10/3. The Airlock contract still has not been signed; technical changes keep extending negotiations. A letter of intent with MAC is allowing them to proceed. ✓

Two meetings are scheduled at MSC on October 11. One will cover the Airlock/KSC technical requirements and the other will cover the crew quarters experiment on which MSFC will now take over the effort. ✓

DAC will be at MSFC on October 13 to discuss three items: (a) micro-meteoroid penetration, (b) quick opening manhole covers, and (c) manual venting of LH₂ tank. Resolution will be made on each of these subjects in preparation for a larger meeting the following day which will cover the same three topics. MSC and MAC will join the meeting on October 14. ✓

ATM:

The work statements for modification of the experiment contracts to reflect specific ATM requirements are in final preparation. The Principal Investigators will receive them by October 17 and contracts should be modified the first week in November. ✓

Astronaut Dr. Curtis Michel and three others will be briefed on ATM at MSFC October 10 by this office, Astrionics, and P&VE. ✓

EXPERIMENTS:

MSFC personnel (I-S/AA and RPL) will meet with NASA Headquarters on October 12-13 to discuss the "EMR" experiments. ✓

PAYLOAD INTEGRATION:

Mission assignments have been provided both contractors for remaining six months study period: Mission SAA-209 to Martin and Mission SAA-211/212 to Lockheed. In addition, both contractors are proceeding with detailing: (1) SAA-209/213 Combined Mission (Tethered concept), (2) SAA-510 and 515 Synchronous Orbit Mission Definition, (3) Mission Analysis (for selected missions), and (4) Plans and Proposals Covering all Missions. (209 and 211/212 assignments are in support to MSFC) ✓

RACK:

At MSC RACK presentation (October 5), Dr. Mueller reiterated desire to retain RACK with M&SS payload and add two earth resource survey experiments. MSC will evaluate for SA-210. ✓

B
10/18

10/10 JTB

NOTES 10-10-66 BROWN

H-1 ENGINE On the morning of 10-5-66, CCSD inadvertently applied the thrust chamber fuel injector purge for sixty seconds on all engines of AS-204, with no purge on in the LOX system. Two engines had throat plugs installed, and the others had thrust chamber exit covers. Enough pressure was applied to blow off or distort the exit covers. Investigation is underway to determine if the injector LOX passages are contaminated with fuel vapor or carbon. A trichloroethylene flush procedure, recommended by Rocketdyne to remove any possible contamination, is being implemented at KSC. ✓

F-1 ENGINE The LOX pre valve shutdown of F-1 engine 1002-3 as reported last week, is still considered to be the cause of the LOX turbopump malfunction, however, analysis of test data by Rocketdyne is incomplete. ✓

F-1 engine thermal insulation has been "fit checked" successfully at MAF by Boeing personnel. The operation involving modifications for stage instrumentation has been performed on S-IC-3, 4 and 5 type engines without any significant problems. ✓

There is a possibility that high reliability pressure transducers will not be delivered to KSC in time to be used on S-IC-1. The first 31 transducers were destroyed due to test equipment malfunction in the vendor's plant. With the loss of these transducers it is probable that SA-501 cannot be retrofit with the high reliability transducers. There is a 48 week lead time for delivery of these transducers. ✓

J-2 ENGINE There was a successful programmed duration, 20 seconds, test at AEDC Friday, 10-7-66. This test was run utilizing the steam ejector to simulate an altitude start of 73,500 feet. All test objectives were met. The data are being evaluated. ✓

An investigation is underway at S&ID, Seal Beach, to determine if four engines on S-II-502 have been contaminated with metal drill chips. Cracks were found in a welded connection between the stage propellant tank and ducts, and bolt holes were drilled in-place. S&ID failed to blank off the ducts and depended on an 80 mesh screen in the duct to catch the chips; therefore, some debris may have passed into the engine. The welded connector was drilled in a similar manner on S-II-501 at MTF. ✓

Engine J-2046 on S-IVB stage 206, has a start tank vent and relief valve whose relief pressure has decayed to the lower allowable limits and will be replaced. The present valve will be returned to Rocketdyne for analysis.

The first J-2 engine for the S-II-506 stage was delivered last week. ✓

!!! Sam Yarchin
B

NOTES 10/10/66 CONSTAN

B 10/18

Nothing of special significance

10/10/66

NOTES 10/10/66 FELLOWS

10/10 JFS

B 10/18

1. Apollo Lunar Landing Symposium: As pointed out in my 10/3/66 NOTES, the Apollo Lunar Landing Symposium to be held in the Morris Auditorium would probably be scheduled early in November. I have now reached agreement with Mr. Owen Maynard, Manned Spacecraft Center, for the symposium to be held on November 14 and 15, as the best mutually agreeable time. Those dates have been confirmed with the Public Affairs Office and placed on the MSFC Major Events Register, with you as the sponsor. ✓

POW 10/10/66 Bonnie FY/R

2. MSFC Roles and Missions: To establish a broad base of uniform understanding and interpretation of MSFC roles and missions, each R&DO laboratory and office director was requested by Mr. Weidner on September 29 to arrange for appropriate dissemination within his organization of the content and intent of your September 22 memorandum, subject: Post-Apollo Roles and Missions of MSC and MSFC in Manned Space Flight, and its enclosure, MSC - MSFC Agreements, as amended by your September 26 memorandum. Mr. Weidner asked that the laboratory and office directors prepare their organizations for aggressive pursuit of those activities where a role has been clearly delineated for MSFC. It was pointed out that at the same time, we must phase out and then avoid those work areas which have been clearly assigned to MSC. An effective screening process, focused primarily at the laboratory/office level, is being established to be sure that we do not inadvertently perform work, in-house or on contract, in areas prescribed by the MSC - MSFC Agreements. A senior representative is being appointed by each laboratory and office to review proposed tasks and procurement requests emanating from within that organization and related to the items addressed in your September 22 memorandum. A secondary screening will be performed by my Program Control Office. Arrangements are being made to increase the visibility of experimental tasks which have received internal Marshall technical approval. Any questionable items can then be resolved well in advance of requests for procurement. ✓

3. Laboratory Single Support Contracts: An initial provision in the laboratory single support contracts allowed a maximum overtime ceiling of 10 percent of the contracted man-years. Stringent controls in laboratory management of those contracts has resulted, in several instances, in an actual experienced overtime usage of substantially less than 10 percent. To allow for maximum regular time use of direct labor man-hours and minimum costs of that direct labor, R&DO single support contractor phasing plans have been adjusted to allow for the use of regular time contractor hours in lieu of previously allowable overtime hours. Copies of the revised phasing plans are being furnished FMO and the Purchasing Office. Appropriate laboratory change requests will be initiated. ✓

10/10 JVS

B
10/18

1. Crossed-Beam Weather Watch: As a result of your suggestion, we are trying to obtain support for environmental applications of crossed-beam technology from agencies other than NASA. Dr. J. P. Kuettner, chief scientist of National Environmental Satellite Center (N. E. S. C.), E.S.S.A. has included the crossed-beam method in his final report on desirable remote sensing methods. Dr. Johnson, Chief of N.E.S.C. is going to officially contact MSFC on this subject. As a result of a presentation to the Institute for Telecommunication Sciences and Aeronomy, E.S.S.A. on September 26, 1966, MSFC will receive a communication from Dr. F. Roach, assistant director, recommending crossed-beam techniques for aeronomy and ionospheric studies. Another presentation was given to the faculty of Colorado State University (C.S.U.) on September 29, at their request. Professor F. Reiter, head of Atmospheric Science, C.S.U., and chairman of the Scientific Advisory Panel to the National Committee on Clear Air Turbulence, is trying to include crossed-beam experiments in the final report of the committee, which evaluates R&D proposals on clear air turbulence for the next five fiscal years. ✓
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10/10 JB

B 10/18

1. MAN-RATING OF VEHICLES: The Air Force Contract Management Division at Cape Kennedy, which is in charge of quality assurance for satellites and spacecrafts and their launch vehicles (combinations based on Atlas-Agena, Thor-Delta, Centaur, Titan III, Gemini), had offered to give MSFC, contractor representatives and KSC a briefing on the man-rating efforts on October 6 and 7. I was among the attendees and so was Mr. Jack Balch with a group from MTF. I consider this a very interesting briefing which was well received and so enlightening that Mr. Balch asked for a repeat performance for more MTF personnel; and I would like to add to the list of future attendees a selected group of MSFC and KSC people. In the man-rating effort, the philosophical difference between MSFC and Air Force which existed several years ago has completely disappeared. The only difference which exists now is that the Air Force has implemented and has in full operation the features which we believe are essential while the MSFC/KSC effort is still a limited one. Attempts to encourage utilization of competent Air Force people (who will become available after the last Gemini launch) in support of Saturn-Apollo launches at KSC have been unsuccessful so far. I'll make an effort to provide visibility of this problem by compiling the requirements we have and comparing them with the capability for implementation at KSC. Hopefully, the Program Managers can help to break the barrier of resistance which exists at KSC. As far as MTF is concerned, I expect that Mr. Balch will draw his own conclusion; he can also have advice or support from the Air Force in some essential areas which are beyond the competency of this Laboratory and other places in MSFC.

El O'Connor
FYI B

It is worthwhile mentioning that the satellites and spacecrafts launched by the Air Force get the same attention as the manned vehicles since, as it was explained in the briefing, they are too expensive to take any risk. The man in charge of a biological satellite endorsed the man-rating effort for his project also because of the tremendous amount of work which goes into the preparation of the experiments and he called his spacecraft "bug-rated". ✓

2. S-II-2 CHECKOUT: Stage checkout of S-II-2 has been completed. There are 30 E.O.'s and 58 squawks outstanding, and in the process of being closed out. S&ID is currently installing the purge leak detection devices on all the LH₂ feedline outlets. The exact amount of MTF deferred work to be accomplished in Station VIII is now being finalized. The estimated MTF shipping date is October 19, 1966. ✓

NOTES 10/10/66 HAEUSSERMANN

10/10/66

B 10/18

1. S-IVB AUXILIARY HYDRAULIC PUMP: It was considered necessary to develop a reliable backup design because of the many problems associated with this component. The major problems have been directly related to the dc motor brush material and to the gas seals required to provide the brushes with the necessary air environment. A decision has been made to eliminate the need for the brushes and air environment for the backup design by utilizing an inverter and induction motor combination. The specification and statement of work required to develop and qualify the backup pump has been completed, and the request for quotation should be submitted by 10/15/66. ✓

10/10/66

B 10/10

F-1

The damaged F-1 engine, S/N F-1002-3, was removed from the Static Test Tower West (STTW) F-1 Test Facility on October 4, 1966, and returned to the Test Laboratory shop for disassembly. The remains of the turbopump will be shipped to Rocketdyne for further analysis. The damaged hardware was removed from the STTW Facility and all systems were secured. ✓

S-1C

The S-1C-3 stage was installed in the test stand on October 3, 1966, and is presently being prepared for systems checkout and the acceptance static firing now scheduled for November 8, 1966. ✓

S-IVB (MSFC)

An S-11 LOX natural recirculation test was performed on October 4, 1966, and the results of this test are being evaluated. Test S-IVB-037 was conducted on October 5 1966, and it was a successful 285 seconds LOX depletion cutoff test. ✓

TULLAHOMA S-IVB

Test J4-07 was a successful 20 seconds test performed on October 7, 1966. ✓

10/10/68

B 10/18

1. MARVES:

MARVES, a special purpose programming system for trajectory problems, has been developed and implemented at the Computation Laboratory. This system consists of a language especially designed for the numerical integration of differential equations and a library primarily composed of subroutines performing the computations encountered in the trajectory area.

Many of the larger trajectory problems have been programmed in MARVES. These include a six degree of freedom booster and upper stage program, and an inter-planetary program. We have also just completed an earth satellite tracking program capable of computing the trajectories of many satellites for long periods of time.

The system has proved to be a significant advantage in both initial programming efforts and modifications of existing programs. Presently, two other NASA installations are using the MARVES system. The air Force and many NASA support contractors have requested MARVES. ✓

← Suggest you ask MSC whether they are interested in a briefing. B

2. SUPPORT OF OMSF: During the past two weeks, the Computation Laboratory has participated in an OMSF-sponsored Management Study of Automatic Data Processing. A task group of Center personnel and Bellcom consultants was called together by OMSF, and has prepared a comprehensive survey of ADP activities for Dr. Mueller to present to Congressional Committees. A second group has identified a number of problem areas in the computer field for further detailed study and solution. The Laboratory furnished one man to each task group. ✓

SA-204 TELEMETRY NOISE PROBLEM: You will recall that we have had a telemetering noise problem since Saturn 6. So far the noise has not exceeded the allowable tolerance and we have been able to live with it. On SA-204 we have had to pass some S-IVB measurements through the IU multiplexer channels to permit their transmission to a downrange ground station. This has, in turn, required that some IU measurements be assigned to S-IVB multiplexer channels. Although the problems have not been isolated, we find that the resultant noise currently exceeds the allowable tolerance and the DDAS generates an alarm signal stopping the computer. For SA-204 we have adopted a workaround solution and will simply inhibit the signal and read the measurements concerned manually rather than using the computer. R&DO is assisting KSC in investigating the noise sources and has been asked to study our tolerance requirements for future vehicles. ✓

ST-124 VIBRATION PROBLEM: Although the error induced in the ST-124 by vibration has not exceeded the allowable limits on our three earlier flights, we have incorporated a change in IU-204 which is expected to further reduce the error. This is a software change to the reasonableness constant to make it reject the noisy signal during the first ten seconds of flight. There is no concern over the structural integrity of the platform; the only damage from the vibration is the induced error. We are considering other changes to further improve performance on subsequent vehicles, if it is required. ✓

DESIGN CERTIFICATION REVIEW: As you know, the Board signed off on the DCR Final Report. I do still have eight actions to close with General Phillips. ✓

NOTES 10-10-66 JOHNSON

B 10/18

10/10/68

Condensing Heat Transfer Experiment - TRW Equipment Lab, Cleveland, Ohio, (Mr. Kovalcik) contacted R-EO for information on providing subject experiment package for a Saturn earth-orbit mission. The package, designed under contract of Wright-Patterson AFB, was originally planned to be flown on a Titan III C mission. Since this ride has not become available, TRW is looking for another possibility. The package of approximately 1200 lbs. and requiring 100 sq. ft. of radiator, would be available for flight in mid-1968. TRW was provided with some information on the Saturn IB vehicle and advised that this AF package would have to be proposed through Gen. Evans to the MSFEB. If required by TRW, assistance with additional information will be provided. ✓

NOTES 10-10-66 KUERS

10/10/66

B 10/18

Meeting of Society of Automotive Engineers (SAE): This meeting was conducted last week in Los Angeles and consisted of a number of forums on Manufacturing Management, Manufacturing Techniques and Materials and other engineering oriented forums on Structures, Propulsion, Ground Equipment, Vibration, etc. We had been invited by the organizers of this meeting from industry to participate in the Manufacturing Management series of meetings. The title of our forum was "Maximum Utilization of New Manufacturing Engineering Technology" under the Chairmanship of Dr. Richard L. Leshner, Assistant Administrator for Office of Technology Utilization, NASA Headquarters. Other participants in this forum were J. Kotanchik, MSC; K. Boucher, DAC; J. Wheeler, Grumman; and myself. Dr. Leshner was very interested in our activities and efforts to bring our Prime Contractors, MSFC, and MSC closer together for exchange of non-proprietary techniques in the area of manufacturing engineering, i.e. tooling, manufacturing processes, equipment, planning and control of complex assemblies, etc. The meeting was, in my opinion, very successful. The importance of this SAE Meeting at Los Angeles lies in the fact that it is organized and attended by the leading managers of the aerospace industry of southern California.

NOTES 10-10-66 LUCAS

B 10/18

1. S-IVB ORBITAL WORKSHOP: Design studies were initiated for the Workshop LH₂ tank internal sleeve for thermal control, the LH₂ tank protrusion pads, the LH₂ tank crew quarters, mobility aids, and lunar floor. Access studies were completed on parts inside the S-IVB stage LH₂ tank which require sealing. Arrangements have been made for a meeting between technical personnel from MSC and MSFC to discuss criteria and technical data in the areas of Habitability and 1/6 g Lunar Floor. The intent of the meeting is to obtain enough criteria for MSFC to begin detail design in these areas. The third draft of the Orbital Workshop R&D Plan has been completed and is in the sign-off coordination cycle with the various Laboratories. ✓

B.L.
Request a
briefing,
maybe at
PAVE,
whenever
you have
some concepts
ready for
discussion
B

2. S-II STAGE: We are maintaining on-site surveillance of S&ID on the S-II vibration qualification test program (Change Order 351). The program is in serious danger of slipping past the scheduled completion date. ✓

1.0.
B

Numerous last minute schedule problems are being experienced on the high force dynamic test program. Every effort is being expended to minimize the effects of problems on the overall test program. ✓

3. AS-203 REENTRY DEBRIS: Large sections of the S-IVB LH₂ tankage from AS-203 were recovered in Peru and have been returned to the Materials Division for examination. ✓

4. SATURN V VOYAGER: We expect to initiate this week a five-month Voyager Shroud Design Study to establish cost and manpower required to develop and manufacture the Shroud. ✓

5. SATURN V SYNCHRONOUS ORBIT MISSION (3 BURN): Agreement has been reached with Douglas Aircraft Company on (1) required long-lead-time modifications of S-IVB stage in line at Huntington Beach and (2) modification kits to be installed at either Sacramento Test Center or Kennedy Space Center. Details of modifications are to be resolved jointly by Douglas and MSFC. ✓

6. ELECTROMAGNETIC RADIATION (EMR) PAYLOAD: We have supplied Research Projects Laboratory's EMR Payload Project with design layouts of EMR experiment configuration, weight summary, man-machine integration requirements, integrated test plan, systems operation requirements, thermal control systems definition data, MSFC rach structural description and test requirements, and resources requirements. ✓

B 10/18

10/10 JPS

FY 1967 MANPOWER CEILING - Mr. Chuck Pace of NASA Headquarters has unofficially advised us that, as a result of the Presidential Freeze, the Manned Space Flight end of the year FY-67 manpower ceiling will be reduced 262 spaces from the FY-66 end of year figure. At this time, only a tentative figure which he declined to disclose has been established for MSFC. Mr. Pace anticipated that the tentative MSF Centers figures will be submitted to Dr. Mueller no later than the middle of this week and that we will be informed of our new ceiling upon Dr. Mueller's decision. The control figures for MSF for FY-67 are as follows:

| | |
|-------------------------------------|---------------|
| Permanent Ceiling Excluding Co-op's | |
| not to exceed | 14,384 |
| All others | 464 |
| Total | <u>14,848</u> |

✓

FY 1967 OVERTIME REDUCTION - Mr. Pace has also advised us that the MSF control figure for overtime will be \$6,821,000 as opposed to \$9.3 million in FY-66. The overtime decision pertaining to MSFC is at the same stage as the manpower ceiling decisions and we will be advised of our new overtime ceiling at the same time we receive our new manpower ceiling. ✓

CONGRESSIONAL STAFF VISIT TO CONTRACTORS PLANTS - Mr. Earl W. Cooper, Professional Staff Member of the Senate Appropriations Committee, plans a tour of NASA West Coast contractors plants during the week of October 17 including visits to North American and Douglas plants. ✓

NOTES 10/10/66 RICHARD

10/10 JVS

B 10/18

No submission this week.

NOTES 10/10/66 RUDOLPH

10/10 JRS

B 10/12

1. S-IC-3 Stage - arrived at MSFC on Saturday, 1 October 66, (4 weeks ahead of schedule). Stage was placed in Test Stand on Monday, 3 October 66. We are looking into the possibility of scheduling the captive acceptance firing for late November 66. ✓

2. S-II-1 Stage Status:

- Tanking tests scheduled to start today, Monday, 10 October 66. ✓
- 1st firing test forecast for Sunday, 16 October 66. ✓
- 2nd firing test forecast for Sunday, 23 October 66. ✓
- On dock KSC date forecast for Thursday, 24 November 66. ✓

3. SA-500F Vehicle Status:

- S-IC Stage - Automatic LOX loading completed on Monday, 3 October 66. ✓
- S-II Stage - Automatic LOX loading 42% complete on Monday, 3 October 66. Balance of test cancelled due to sluggish operation of LOX fill and drain valve (test will not be rescheduled). ✓
- Launch Vehicle - LH₂ and LOX loading test were scrubbed on Saturday, 8 October 66, after S-II LOX fill and drain valve failed in closed position with 40% LOX on board. (Test rescheduled for Tuesday, 11 October 66. ✓

B 10/18

NOTES 10/10/66 SPEER
10/10/66

1. APOLLO SHIP MEETING: A special Ad-hoc group including Gen. Phillips and Mr. Christensen met in D. C. to discuss the problems associated with the implementation and deployment of the Apollo ships. The ships have slipped so significantly in schedule that the continuing requirements for them may endanger the Apollo-Saturn launch dates. The three main parties involved MSC, GSFC and DOD all presented their position. Gen. Phillips made it quite clear that the launch dates must not be endangered. DOD's response was essentially non-support of AS-204, 205, 501 and 502. GSFC proposed to reduce the relatively long metric ship evaluation while still providing some metric tracking capability. No apparent solution to the problems appeared. Gen. Phillips took all proposals under consideration and promised to reach a decision within two weeks. ✓

2. AS-204 LAUNCH WIND RESTRICTIONS: AS-204 Launch Mission Rules concerning launch wind restrictions and service structure return to the vehicle in the event of high surface winds have been submitted to KSC. The wind restrictions are briefly: 46.1 knots (peak) prior to S-IVB LOX loading; 27.0 knots during simultaneous S-IB/S-IVB LOX loading which is the expected procedure for AS-204; and 32.0 knots through LH₂ loading until liftoff. The liftoff restriction is 24.5 knots based on spacecraft structural limitations. Should high winds develop during or after LOX loading, the wind limits may be increased back to 46.1 knots by pressuring the S-IB LOX tanks. Due to the time of year for this launch, the probability of exceeding any of the above limits due to thunderstorm activity is very small. ✓

3. VOYAGER OPERATIONS PLANNING: We are investigating the MSFC role in Voyager operations and the management channels for submitting operations support requirements for the Voyager launches. We will attempt to identify any possible launch vehicle flight control actions which may be required prior to S/C separation, and to propose from what ground facility this control might be exercised. It is anticipated that the ground activities during this first flight phase will consist primarily of monitoring launch vehicle behavior and advising the Mission Director at JPL. This could be done from the Huntsville Operations Support Center. In the operations support requirements area, the problem is to agree with JPL on the route for submission of launch vehicle requirement; i. e., through the established MSF channels or through established OSSA channels. ✓

10/10/66

B 10/18

1. ATM - CONTAMINATION OF SPACECRAFT ENVIRONMENT: In an effort to clarify and alleviate the problem of optical contamination in the ATM environment, we have carefully studied existing reports; we initiated several new studies (inhouse; Ball Brothers; High Altitude Observatory); we established contact with workers in this field at OSSA and MSC; we are riding herd on experiment planning at MSFC; and we are negotiating with Dr. Len Reiffel (OMSF) and Dr. Curt Michel (astronaut scientist assigned by MSC to the ATM) for inclusion of photographic picture-taking as an "operating procedure" on the Gemini 12 flight. Considerable concern presently exists with some of the ATM P.I.'s. We hope that the present efforts will yield results that help to avoid undue interference of contamination particles with astronomical observations.

E.S.
Let's
lick this
problem
before
we fly
our first
ATM

2. ATM - POINTING AND CONTROL SYSTEM (PCS): The pointing accuracies required by the Principal Investigators (P.I.'s) of ATM are leading to a serious problem. It looks like the pointing accuracy can only be fulfilled by a more elaborate control system than previously visualized. The Experiment Scientists in Space Sciences Laboratory are pulling the experiment requirements together. We have had numerous discussions with the P.I.'s, with the ASTR Experiment Engineers, and with the ASTR people working on the PCS of ATM. One essential difficulty in finalizing the requirements with the P.I.'s is the lack of a firm description of the ATM system at this time.

Let me
know
where I
can help

3. EMR PROJECT: Dr. Carruthers of NRL hopes to have a working prototype of the far-UV 4" Schmidt spectrograph available for demonstration to Dr. Newell during his visit here October 20. We will work with Dr. Carruthers in making the necessary arrangements, including the furnishing of a vacuum roughing pump and LN₂.

NOTES 10/10/66 WILLIAMS

10/10/66

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10/12

1. Saturn Improvement Studies: We had final reviews last week on a series of FY-65 funded Saturn Improvement studies, including all Saturn stage contractors, several propulsion contractors, plus Martin/Denver (KSC-sponsored study of impact upon launch facilities and operations). The studies include Saturn IB uprating, solid boost S-IVB, Saturn V uprating, and "Saturn Intermediate" vehicles (vehicles using 2 of 3 Saturn V stages for payload capability between the Saturn IB and Saturn V). ✓

We are preparing a condensed summary for presentation to you in a few weeks. ✓

2. Project Able: The midterm reviews of all five Project Able contractors were completed on October 7. After the October 11 presentation of these contractors to DOD and NASA Headquarters, we will provide a resume' of DOD's interest in the project. Work to date indicates that any reflector greater than 1,500 feet in diameter is not possible prior to 1970. A more practical approach is 700 to 800 foot diameter reflectors. ✓

OCTOBER 17, 1966

NOTES 10/17/66 BALCH

10/17/66

B 10/25

S-II-1 Testing - Rework of purge channels around LH₂ feed duct connections, necessary because channels had become clogged when insulation was foamed in around connections, delayed LH₂/LN₂ tanking from Monday, 10/10/66 to latter part of the week. Late Friday, 10/14/66, during pressurization of sidewall purge system, a section of sidewall insulation became detached from the sidewall. Repair of insulation and checkout of purge system are expected to be completed later today, after which LH₂/LN₂ tanking is to be initiated. ✓

S-IC Test Stand - Completion of installation of test spiders and start of structural load test on hold-down arms are expected early this week. ✓

LN₂ Procurement - Ample supply of LN₂ to meet all requirements has been delivered on emergency buy initiated, 10/4/66. Air Reductions LN₂/LOX plant at New Orleans is expected to be back in full production late tonight. ✓

MTF LOX Barges - Repair of LOX Barge No. 4 has been started at MTF and is scheduled to be complete on 10/28/66, with full set of improved pumps installed. LOX Barge No. 5 has been moved to MSFC, Huntsville, for repair. ✓

Labor Relations - The complaint of the International Association of Machinists and Aerospace Workers (IAMAW) concerning action to have GE employees instead of GE subcontractor employees operate heating plant has been referred to the President's Missile Sites Labor Committee, and no further problems in this connection are expected for the time being. ✓

MTF Employees Recreation Association - All necessary approvals of charter have now been obtained, including that of the Secretary of State of the State of Mississippi. ✓

"Aviation Week" Special Report on MTF - Writer from "Aviation Week" was at MTF two days this past week to get material for a story on the site. He indicated the story will appear in a November issue. ✓

NOTES 10/17/66 BELEW

10/17/66

B_{11/25}

LMSC EFFORT ON ATM: We met with R-ASTR, R-AERO, and Lockheed to discuss their role in conjunction with in-house ATM effort. Good progress was made in identifying specific areas where Lockheed can materially supplement our in-house effort. ✓

LAUNCH VEHICLE SUPPORT TO AAP: We have started discussions with the Launch Vehicle Systems Engineering (Sat IB & V) offices relative to the systems engineering effort required for AAP mission and its relationship to the integration activities. I am attempting to develop a "mission development cycle" matrix which will identify the project, launch vehicle, and mission "tasks" so that we can begin to get some of these "operational" interfaces working. ✓

S-IVB MODIFICATION FOR THE 209 MISSION: A meeting was held with DAC and MSFC on a quick opening hatch for the Mission Module Airlock access opening and on fire preventatives for the mission module. A quick opening hatch has been recommended by both MSFC and DAC. DAC and MSFC investigations (testing) on dynatherm, thin aluminum foil, and kapton proposed by MSC will continue until a decision is made by or before mid December 1966. ✓

CREW QUARTERS TECHNICAL COORDINATION: A meeting was held October 11, 1966, at MSC with P&VE, IO, and MSC personnel to discuss and obtain crew quarters criteria from MSC. MSC was very cooperative and it looks like we obtained agreement with MSC on MSFC taking the lead on the mission module habitability experiment. ✓✓

ATM BRIEFING TO ASTRONAUTS: The ATM briefing to Dr. Michel (plus three scientist astronauts) was well received, but they were concerned over the limited scientist role.

GENERAL: Headquarters has requested MSFC to prepare an Experiment Implementation Plan (EIP) on eight more experiments proposed for alternate 209 flight. MSFC will work with development center on EIPs. The experiments are: Vectorcardiogram, Human Vestibular Function, Neurological Study (EEG), Time and Motion Study, Meteoroid Impact and Erosion, Jet Shoes, Meteoroid Velocity, Heat Pipe. ✓

"Jet Shoes" Experiment T-020: Langley Research Center wants MSFC to fabricate the "Jet Shoes" in-house for lowest cost. MSFC must decide quickly on this request to keep schedule. ✓

NOTES 10-17-66 BROWN

B 10/25

10/17/66
H-1 ENGINE A Rocketdyne TWX recommending action to remove possible contamination in AS-204 as a result of incorrect CCSD procedure, was provided to the S-IB Stage Office on 10-7-66. The recommendation consisted basically of the following: (a) Remove and clean all GG LOX bootstrap lines; (b) Remove the unitized check valve of the two engines that had throat plugs installed, and swab check them for contamination; and (c) Trichloroethylene flush all LOX domes per the R-3620-3 manual. ✓

F-1 ENGINE Reference Grau Notes 9-12-66 (copy attached) on F-1 engine component qualification: the reports presented at the completion of the Component Qualification Test Series were not in acceptable format and/or in sufficient detail. Additional information was provided in meetings between I.O., R&DO, and Rocketdyne personnel. Agreement was reached that all the F-1 Components were qualified for flight as of 9-30-66 with the exception of the Turbine Out Temperature Transducer, which will require redesign. This temperature measurement is not mandatory for launch or flight operation. The reports will be amplified to clarify test results and resubmitted. ✓

C-1 ENGINE C-1 funds were held up in Dr. Seaman's Office, causing RMD to operate on their own funds for approximately two weeks. This obviously is a very poor position to place our contractors in. Only enough money was released to carry the program through November, 1966. (We're now apparently being "spoon fed.") ✓

J-2 ENGINE Reference Mr. Grau's Notes of 9-19-66 (copy attached), the following is offered: Cracked solder joints currently being discovered by microscopic inspection are not causing electrical failure after ECA assembly. We have manufactured and delivered 50 ECA cans which have accumulated approximately 1,000 tests and 100,000 seconds without a solder joint malfunction. This is the same type unit that flew on SA-202. ✓

The ECA has been satisfactorily tested at temperatures and vibrations in excess of flight environments. We feel the investigations being pursued at Rocketdyne and MSFC are comprehensive enough to find the cause for the cracks. From these investigations a recommendation has been made and accepted to insulate the ECA on vehicle 204 to reduce thermal shock. We feel from available data that a crash redesign of printed circuit boards is not required. However, Rocketdyne has some design improvements in development which should further improve solder connections. ✓

ATTACHMENT: NOTES 9-12-66 GRAU

NOTES 9-19-66 GRAU

(Dr. von Braun's and Mr. Weidner's copy only)

B 10/25

10/17/90

CONTRACT ACTIVITIES

Negotiations completed with Chrysler Corporation Space Division for procurement of long lead time materials, components, parts, and engineering support. Total cost including fee \$7,201,548. Procurement package to be forwarded through Marshall to Headquarters for approval on or before October 21, 1966.

Contract action underway providing for exercise of Government option for continuity of support services at Michoud performed by Mason-Rust and computer services at Slidell performed by Ling-Temco-Vought. ✓

NOTES 10/17/66 FELLOWS

Boyer

10/17/66

1. Mobile Service Structure (MSS) Auxiliary Damper System: As a result of the MSS Auxiliary Damper System Preliminary Design Review held at MSFC on Sept. 30, it was decided that two 12" x 15" slots will be cut into the web section of a 30" I beam on the MSS to accommodate the two trunion mounted/counter balance damper cylinders. Each damper cylinder is counter-balanced to facilitate ease of handling. Each cylinder for the Launch Escape System (LES) interface is fabricated with an aluminum, teflon lined conical receiver with a lanyard release latch for positive guide and attachment to the LES tower. The cylinder will be extended during the connect sequence at a rate of 1 inch/second. The connect operational sequence is expected to consume about five minutes operating time to accomplish the connection.

Four operating panels will be required on the MSS for the auxiliary damper system:

- a. A Hydraulic Power Unit Panel in lieu of the S-II/S-IVB hydraulic servicers.
- b. A Control Panel to extend and retract the damper cylinders.
- c. Two Damper Panels (one for each cylinder) to operate components in the damper circuit.

The auxiliary damper system is charged, self-contained, and calibrated, except for heat exchanger cooling water and the pneumatic supply to operate the hydraulic oil intensifier. ✓

2. Rack Research and Development Plan (RDP): The first issue of the Rack RDP was furnished to IO on Aug. 16, 1966 so that IO and the laboratories could proceed as early as possible with a common plan. An updated RDP, Revision A, for the Rack was approved by R-DIR and forwarded to IO on Oct. 14. This revision of the Rack RDP represents no major departure from the first issue RDP but reflects more accurately the total requirements and an improved cost estimate. ✓

3. AS-204 Interface Control Documents: One hundred and forty Interface Control Requirements have been identified by R&DO for AS-204. Of these, 136 Interface Control Documents (ICD) have been delivered to IO for program approval and implementation. The remaining four ICD's (all for ESE) will be furnished to IO within three weeks, in ample time for use with AS-204. ✓

NOTES 10/17/66 GEISSLER

B 10/25

10/17/90

1. Laser Doppler Orbital Wind and Micrometeoroid Velocities Detection:

A discussion with Mr. Schuler concerning your comments on this technique (Notes 9/12/66 Geissler, copy attached) indicated that his concern was in the area of cryogenic fluid flow. He had no reservations of this technique for wind velocity and gas flow measurements in general. ✓ The original work on the laser doppler technique for gas velocity measurement was performed by Aero-Astroynamics Laboratory. Very good agreement has been obtained between the doppler velocity instrument and other velocity measuring instrumentation. Many of our results have been documented. Measurements were initially performed in a small wind tunnel up to 200 ft./sec, and subsequently at velocities up to $M = 1.5$ in our 7-inch wind tunnel. There were numerous problems in detecting the doppler frequency shift such as high vibration and noise environment, intensity of the scattered signal and high frequency electronics. All of these problems have been solved for the wind tunnel measurements thus far. The results have been extremely favorable. The problems of extending the velocity range, and increasing the acoustic and vibration environments for rocket exhaust applications are reasonably straight forward. The measurement of rocket exhaust velocity with the doppler instrument is part of our present program. Because of favorable results on our wind tunnel measurements, the measurement of wind velocity seems a natural extension. Since basic feasibility has already been proven, the principal remaining problems will be the scattering intensity from the aerosols, the maximum range for detecting the scattering intensity, and heterodyning. ✓

2. Lifting Body Experiment: We recently evaluated a Northrop proposal for a lifting body vehicle (LBV) reentry experiment program for IB/AAP flights. The following results were given to the S/AA Program Office: This type experiment seems desirable since it would be a logical continuation of current lifting body research at Ames and Langley, thereby providing valuable large-scale data, and would also be the most economical step towards a future advanced launch vehicle system. Possible drawbacks are: (1) Duplication of Air Force's research efforts on advanced SV-5 (PRIME and PILOT) programs; (2) MSFC's role would probably only be S/AA program integration and payload rack development, rather than responsibility for developing and flying the experiments; ✓ and (3) considerable AAP funds would be required for this program, if it were not funded by another program. ✓

3. Mars Surface Sample and Return Probe: We certainly agree with your conclusions concerning the requirements for accurate targeting techniques for the Martian surface lander (Notes 10/ 3/66 Geissler, copy attached). This is one of the problem areas that we are presently analyzing. A study of the environmental conditions at various locations on the Martian surface is being conducted by our Aerospace Environment Division, and Dr. Dan Hale from RP is analyzing the question of preferred landing sites from a scientific experiment viewpoint. Their results will be combined with the approach and departure conditions of the manned flyby spacecraft, and hopefully will permit us to establish a feasible probe lander and return mission without an excessive degree of compromising the scientific objectives. ✓

10/17/66

B 10/25

1. ECA PACKAGE: With regard to your questions on Item 2 of NOTES 9-19-66 GRAU (copy attached), we are preparing a proposal on how to overcome the ECA Package problems.. By October 20, 1966, we will send you a report. ✓
2. KSC INTERFACE PROBLEMS: With regard to your question on Item 3 of NOTES 9-19-66 GRAU (copy attached), General Shinkle has been briefed on the KSC Support Contractor interface problems by Mr. Paul Bates, I-V-Q, and Mr. Ernst Klauss of this Laboratory. ✓
3. IBM-HUNTSVILLE QUALITY AND RELIABILITY SURVEY: The Quality and Reliability Survey of the IBM Huntsville facility was completed September 30, 1966. A large number of discrepancies were noted by the survey team. The IBM quality program is quite deficient in publishing and implementing the basic program controlling documentation. The quality program plan is being revised and we have reviewed and commented on the second draft of the plan. The Quality Control Manual is mostly obsolete, but IBM is now rewriting the Quality Control Instructions and Quality Control Procedures. Most of the discrepancies noted during the survey can be related to the lack of these basic controls. ✓
4. RELIABILITY SUPPORT CONTRACT: The Federal Electric Corporation (FEC) has made good progress in staffing to support our reliability area, with staffing about 85% complete. However, FEC has encountered problems in recruiting and holding personnel for the resident offices in the field. It is expected that staffing will be complete in October. It is too early to completely evaluate the work, much of the first quarter being devoted to recruiting and orientation; however, FEC's output is increasing, and satisfactory results begin to show up. ✓

ATTACHMENT: NOTES 9-19-66 GRAU (Dr. von Braun's and Mr. Weidner's copy only)

B_{10/25}

9619/11. ATM COST ESTIMATE: Detailed estimates for in-house responsibilities were completed this week and submitted to R&DO and IO. Current estimate is 26.173 M. Detailed schedules are being refined for the activities of each laboratory. Those estimates and schedules are for the LM ascent stage/ATM half rack without gimbal pointing of the experiment package.

Detail design for this configuration is proceeding and long lead-time hardware is being procured. Subsequent to a final configuration decision, those costs and schedules will be re-evaluated for impact. Close liaison with the ATM Principal Investigators for experiment definition and interface determination is continuing with good cooperation and meaningful results. ✓

F-1

X810/17

B10/25

Preparations were made on the West Area F-1 Test Stand for a series of tests investigating GG oscillations with F-1 engine S/N F-4T2. These tests are scheduled to start this week.

S-1C

The S-1C-3 acceptance firing has apparently been delayed until November 29, 1966, by agreement of Mr. Urlaub and Boeing.

S-11 (MTF)

The S-11-1 tanking test was not accomplished during the week of October 10, 1966, as planned. The purge coils which were installed around the LH₂ feed ducts had to be reworked due to flow obstructions and leaks. The tanking test was officially canceled for the week when debonding occurred in an area on the LH₂ tank sidewall insulation. Efforts are being made to complete repairs of the debonded area in time for resumption of the test on Monday, October 17, 1966.

S-IVB (MSFC)

Test S-IVB-038 was run October 12, 1966, for a duration of 234 seconds. Cutoff was by fuel depletion. A small hole on the outside of the thrust chamber caused a small fire shortly before cutoff. No damage occurred.

ARM No. 9 - COMMAND MODULE ACCESS ARM

During the full motion simulation test we have encountered difficulty connecting the Access Arm Environmental Chamber to the Command Module simulator at extreme vehicle excursions. KSC is aware of problem and is investigating a design fix. Environmental chamber hood adapter design was changed two years ago to accommodate a command module change by MSC. KSC apparently never checked the influence of this change on the connect capability. Existing hardware capable of \pm seven inch vehicle movement while test criteria requires \pm 15 inches.

GSE - GENERAL

Dr. Debus was at the Laboratory on Tuesday, 10/11/66, to discuss the Swing Arm Test Program. We again discussed our concern of hardware complexity, no LV0 participation in program, and the modifications that will have to be installed at the Cape. He was in favor of a pad disconnect test of the arm systems and promised to get with his people to investigate our concerns. We know he is planning a Swing Arm DCR (Design Certification Review) on 10/21/66, which is a step in the right direction. In addition, Boeing is phasing more into swing arm activities and we are hoping they can bridge-the-gap between KSC and LV0.

NOTES 10-17-66 HOELZER

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12/17/68

Negative Report.

NOTES 10/17/66 JAMES

B10/25

10/17/66

S-IB FOLLOW-ON CONTRACT: On Friday, October 14, negotiations were completed with CCSD at Michoud on the long lead time items for the Saturn IB follow-on. This includes long lead time material and required early work for the S-IB stage for vehicles SA-213 through SA-216. This should support our objective of meeting the mid-September 1968 KSC delivery date for SA-213 providing we receive approval to negotiate for complete vehicle stages in January of 1967. Negotiations ended up with an agreement on fee of approximately 6.6%. ✓

SYSTEMS ENGINEERING CONTRACT: We started our negotiations with CCSD on the Saturn IB systems engineering contract last Friday. We plan to negotiate the systems engineering for the SA-209 S-IVB workshop mission and the other alternate missions through SA-212 with the primary mission work. ✓

SA-204 PREFLIGHT REVIEW: The SA-204 Preflight Review previously scheduled on November 2 and 3 has been rescheduled for November 15¹⁶ and 16¹⁷. The Systems Engineering and Mission Operations portions will be conducted on the afternoon of November 15¹⁶ and the Stage and GSE portions will be conducted on November 16¹⁷. ✓

ST-124M ACCELEROMETER VIBRATION PROBLEM: Dr. Haeussermann reported in his 9/19/66 notes, copy attached, a possible fix on 204 for the accelerometer vibration problem. You wanted to know if we had adopted this fix. We did adopt his recommendation as we reported in my 10/10/66 notes, copy attached. ✓

SYSTEMS ENGINEERING EFFORT FOR SAA ALTERNATE MISSIONS: In my 9/26/66 notes, copy attached, I reported how we plan to handle funding for the SAA alternate missions. You asked if we were in trouble with Davy Jones' office on this. We have made arrangements with the AAP office on covering systems engineering effort in the Chrysler contract for the alternate missions. ✓ Although money is short, we believe we have solved the immediate problem with respect to the current AAP mission changes by covering SA-210 through SA-212 from Saturn IB resources. ✓ (Internal MSFC only)

(3 attachments described above)

FOR INTERNAL USE ONLY

B10/25

10/17 JLB

Supporting Development and SRT Funding Levels The funds available for SRT and Supporting Development activities are beginning to reflect the overall reduction in total agency budget. So far as we can now determine the Center is receiving a fair share of the total SRT/ART and development funds; however, some of the programs developed to do non-end-item type research are losing support through diversion of resources at Headquarters to established end-item efforts (Workshop; ATM; etc). This will not seriously hamper the current efforts in the Center, but it is a matter which will need some high level discussion in connection with the establishment of next year's budget. We are preparing an analysis of the current status of funding and predicted levels of requirements and support for future activities. This will be provided to you when complete. ✓

Pegasus Coupon Measurement and Retrieval The MSFC proposed experiment to conduct measurements "in situ" of the α/ϵ on some of the thermal samples placed on the Pegasus III and to recover and return these and some of the meteoroid detector coupons for laboratory analysis has been reviewed by the Headquarters Experiment Coordination Panel and provisionally accepted for submission to the MSFEB subject to the establishment of mission compatibility by General Jones' office. OART is the sponsoring program office. Astrionics and Space Science Laboratories are principal investigators. It is anticipated that the recovery would be a part of the 210; or a subsequent, mission. ✓

Project SUPER In response to your questions on this item as reported in the Notes of 19 September (attached), Arnold Engineering Development Center would normally develop and fabricate the instrumentation involved either on direct contract or within their own facilities. Because of manpower and funding limitations imposed upon them, they are not now able to do so. The work is of a relatively low priority and does not constitute a valid basis for a request for additional manpower or extra funding. Their request to us was for help on an "as available" basis and would not involve transfer of funds for labor. They would bear materials costs. The instrumentation involved would improve the capabilities of test facilities which we occasionally use; however, the political wisdom of showing any surplus shop capability has not yet been determined locally. Therefore, no decision has been made on accepting the task. If you like, we will brief you on this.

BN, Trade-off between buying good will and appearing fat. Suggest a small support effort.
B

DIR

NOTES 10-17-66 KUERS

10/17 KB

B 10/25

MSFC Sterilization Program: The Sterilization Program at MSFC, as part of the unmanned Voyager-Lander Spacecraft Program, has been funded in the past three years by OSSA for about 1.5 to 2 million dollars. A large part of these funds has supported out-of-house contracts. MSFC has succeeded in accomplishing at least two major breakthroughs in our contract efforts:

a. A Design Criteria phase in which research on the terminal heat cycle successfully demonstrated its applicability to the sterilization program. A Design Criteria Manual was furnished OSSA for their sterilization program. The contract was managed by P&VE Laboratory and the manual was completed on December 15, 1965. ✓

b. A Manufacturing Procedures Manual in which the groundwork was established for the processing of hardware for the sterilization program. The contract was managed by the ME Laboratory and completed on September 15, 1966. ✓

Other contracts which MSFC is managing include:

a. "A Challenge System for Validation of Sterile Assemblies", with the McDonnell Aircraft Company, initiated in June 1966. ✓

b. "A Development of a Typical Mass Landing Capsule Sterilization Container", with the Avco Corporation, initiated in June 1965. ✓

In order to establish rapport between the Centers and OSSA personnel, MSFC established a panel (see attached*) and oral quarterly review meetings with MSFC contractors. The progress of work is discussed by the contractors and panel members. In the last review held at the General Electric Company, OSSA personnel were highly pleased with the progress of work accomplished in the MSFC managed contracts. ✓

NOTES 10-17-66 LUCAS

B10/25

1. S-IVB STAGE PANEL FLUTTER TEST: The panel flutter tests, at AEDC's 16 ft. transonic wind tunnel were completed satisfactorily at 6 a.m., 10-11-66. As predicted by P&VE during the last 12 months, limited amplitude flutter was indicated by test data, but the levels of response were so low that the test specimen was in no danger of failure. The test panels sustained 40 minutes of accumulated test time of limited amplitude flutter. Since this flight configuration of the S-IVB forward skirts was subjected to test conditions that are characteristic of actual flight, it is expected that the flight vehicle will perform without panel flutter failure. Four parameters were varied in the tests: (a) Mach number, (b) dynamic pressure, (c) compressive load on the S-IVB skirt, (d) delta pressure across the skirt. Test data are being evaluated and the first interim report is expected in 14 days. As stated in the past, P&VE recommends no modification of the S-IVB stage forward or aft skirt. ✓

2. S-II STAGE HIGH FORCE TESTING: On 10-7-66 at 8:30 p.m., a successful longitudinal axis high level random vibrational test was accomplished on the S-II thrust complex. Since the thrust complex is the most complicated specimen to be tested, this mechanically induced vibrational test was considered more likely to produce failures in the mode simulating flight conditions than other vibration tests. Completion of this test without failure greatly increases confidence in the structural integrity of the thrust structure. ✓

3. GROUND TEST MODULE: Representatives from MSFC, NASA Headquarters, and Space Nuclear Propulsion Office met to discuss a GTM End Item Spec and interfaces. A rough outline of the GTM End Item Spec was reviewed and agreed upon in general. GTM to facility, engine, etc., interfaces were identified and personnel of each concerned organization were designated to work together in establishing and identifying major requirements. A draft copy of the End Item Spec will be complete about 12-1-66. It is planned to transmit the final spec to Mr. Finger for approval on 5-1-67. ✓

4. CRYOPROPELLANT STORAGE: Between 300 and 400 persons (approximately 200 from out of town) attended the MSFC-sponsored conference on "Long-Term Cryopropellant Storage in Space" (organized by Propulsion Division) on October 12 and 13. Representatives from 49 companies, 6 universities, and 3 government agencies were in attendance, including such names as Dr. Clark (University of Michigan) and Dr. Zuber (UCLA). Papers were presented by aerospace industry and NASA laboratories (Lewis, MSC, and MSFC). The objective of the conference to promote direct exchange of information on this important subject was met. A copy of all papers presented (about 1 in. thick) was given to each participant. A short summary of significant items is being prepared for you. ✓

5. INTERNATIONAL ASTRONAUTICAL CONGRESS: A paper entitled "Lunex II, A Study on Manned Lunar Exploration" by M. Vaccaro and H. Grubbs of P&VE, Dr. S. Deutsch, OART, and Dr. N. Burns of Honeywell was presented by Dr. Burns at the XVIIth International Astronautical Congress, Madrid Spain, on October 10. ✓

W.L.
I'd like
to see it
when
ready
3

B 10/25

9/8/17

HM,
Any
suggestions?
B

MSFC APOLLO COST POSITION - A comparison between actual costs and costs predicted in MSFC POP 66-3 and MSF POP 66-3 shows that our actual Apollo costs for the first quarter of FY 67 are below both the MSFC POP 66-3 plan and the reduced plan (targets) in MSF POP 66-3. Information furnished Headquarters indicates that average monthly first quarter actuals were about \$115.6 million as against \$126.0 million in MSFC POP 66-3 and a target of \$118.0 million in MSF POP 66-3. If this trend continues and if the trend at MSC continues above target costs, MSFC will probably lose funds to MSC during FY 1967.

ECONOMIC IMPACT STUDY - We have scheduled the Staff Luncheon on October 28 to present the results of this study - after submission to MSF. The summary results obtained based on no follow-on to Apollo, are:

| | <u>Reduction in Total Workforce</u> | |
|--|-------------------------------------|----------|
| | <u>Workers</u> | <u>%</u> |
| Huntsville-Madison Cty | 22,894 | 26.3 |
| Michoud (Greater New OrL) | 20,343 | 4.9 |
| MTF | 7,821 | 11.6 |
| (Pearl River & Hancock Cty Harrison & St. Tammany Parrish) | | |

Michoud and MTF impacts assume complete phase-out. The Huntsville impact is based on the assumption that SRT and Advanced Studies workload increases to utilize all multiple purpose facilities, (from a current level of 1,500 to 4,000 employees).

If this increase does not occur, the Huntsville impact indicated above will increase to 26,700 jobs for a total reduction in workforce of 30.6%.

No effort has been made to investigate outside forces such as: Army expansion, contractor efforts to bring in non-space activity, new industry locating in Huntsville as labor and public facilities become less critical. However, our first rough order of magnitude estimate is that these forces would not reduce the Huntsville impact to less than 15% reduction in total workforce. ✓

Heat as sensitive!

B

NOTES 10/17/66 RICHARD

B 10/25

10/17/66

Redundant Engine Shutdown for Crew Safety: At present there exists a requirement for a redundant method for thrust termination in order that under all conditions a successful crew abort can be accomplished. This redundancy is at present achieved by (1) use of primary engine shutdown system and (2) use of stage prevavles. The recent F-1 engine LOX prevolve shutdown which resulted in an engine explosion has raised considerable doubt as to whether the use of the prevavles can be relied upon for safe abort. A meeting will be held Oct. 17 to initiate work to determine what can and should be done to assure safe crew aborts. If the prevavles cannot be used on the S-IVB stage, one of two things must be done--a rather extensive S-IVB stage modification or the assumption of a greater risk factor for the crew on SA-204. This prevolve shutdown problem exists on all stages with perhaps the exception of the S-IB stage. Efforts to resolve this problem will proceed on a high priority basis, and this office will keep concerned parties posted on the status of the investigation. ✓

NOTES 10/17/66 RUDOLPH

B_{10/25}

10/17/66

1. SA-500F Vehicle Status:

- o Propellant loading of SA-500F Vehicle satisfactorily completed on Thursday, 14 October 66.
- o Vehicle rolled back into VAB on Friday, 15 October 66.
- o Vehicle has been de-erected down to the S-IC Stage and the S-II-F Stage is currently being modified at KSC to a S-II-F/D Stage configuration.
- o The S-II-F/D Stage is scheduled to leave KSC on Monday, 31 October 66, and is expected to arrive at MSFC on Saturday, 12 November 66 for use in the Dynamic Test Program. ✓

2. SA-501 Vehicle Status:

S-IC-1 Stage - to be erected on Monday, 24 October 66. ✓

S-II-1 Stage:

- o During tanking test attempt at MTF on Friday, 14 October 66, insulation purge gas leakage was detected. Investigation revealed a 3 ft X 4 ft area of LH₂ sidewall insulation had debonded.
- o Repair has been made and insulation verification is forecast for 11:30 am, today, Monday, 17 October 66.
- o Pre-countdown to tanking forecast for 12:00 noon, today, Monday, 17 October 66, with tanking forecast to start between 2:00 pm and 3:00 pm, today, Monday, 17 October 66.
- o 1st firing test forecast for Sunday, 23 October 66.
- o Estimated on dock date at KSC is Thursday, 1 December 66. ✓

S-II-1 Spacer - to be stacked on Tuesday, 25 October 66. ✓

S-IVB-1 Stage - to be stacked on Wednesday, 26 October 66. ✓

S-IU-501 - to be stacked on Thursday, 27 October 66. ✓

3. S-IC-3 Stage - acceptance testing has been rescheduled from Thursday, 3 November 66 to Tuesday, 29 November 66, to permit incorporation of late changes prior to acceptance testing. Acceptance testing will be one week ahead of schedule and the stage is still expected to be delivered to KSC approximately four weeks ahead of schedule. ✓

4. Saturn V/Voyager - Engineering Implementation Panel Meeting is scheduled at MSFC on Thursday, 20 October 66. Attendees from JPL, OSSA, MSF, and KSC are expected. Mr. Luke Spears, R-AS, is the MSFC Co-Chairman. ✓

B 10/25

10/17/66 SPEER

1. AS-204 NETWORK SIMULATION TESTS: The Network Simulations (NS-2) in preparation for AS-204 have had limited success to date. No complete simulations have been conducted as yet. Activity has been limited to onsite testing at the manned sites and telemetry and command data flow testing between the unmanned sites and the Mission Control Center - Houston (MCC-H). Primary emphasis has been placed on evaluation and verification of the test tape provided by GSFC (based on MSC and MSFC requirements); network software; data flow to MCC-H and network checkout procedures. The main problem existing now is the mixing of up to three PCM links for the high speed data flow to the MCC-H, using Univac 642B computers for the first time. Our MSFC flight controllers at Carnarvon and Guaymas are expected to return later this week. ✓
2. AS-204 INFLIGHT TIMELINE UPDATE: In recent discussions relative to the AS-204 flight plan, it has been identified by MSC that two modifications to the orbital sequence timeline are desired, one a switch selector time reference shift and the other an orbital maneuver time change. Since these changes cannot be accommodated at this late date in the on-board flight program, MSC is apparently planning to accomplish these modifications by use of the L/V digital command system during orbital flight. We have participated with MSFC in reviewing all associated aspects of such a plan; no technical rationale against pre-planning these ground commands has been identified as long as the commands are not in series with the main line mission. Pre-planned ground commands as these impact both our MSFC Flight Controllers' activities and the vehicle sequence. Therefore, an effective control scheme needs to be worked out jointly with both Program Offices to protect MSFC from undesirable "surprises". Col. James is preparing a letter to Dr. Shea specifically addressing the above 204 command requests. ✓
3. LAUNCH WIND EVALUATION: As a part of our continuing effort to improve the response time of the joint MSC-MSFC wind evaluation for marginal conditions during launch, and after obtaining principal agreement with Gen. Shinkle, we met with KSC on October 11 to discuss the arrangement for getting Jimsphere wind data to the Huntsville Operations Support Center (HOSC) in realtime. The meeting resulted in a jointly proposed technical approach, however there appears to be a 8 to 9 month leadtime and about \$25 K involved. We are now preparing a formal requirement and KSC will give us their position on funding in the near future. ✓

NOTES 10-17-66 Stuhlinger

B 0125

1. ATM PRESENTATION: A presentation on the ATM experiments was given to four scientist astronauts on Oct. 10. The discussion was centered on astronaut operations, including pre-flight training, in-flight operations, and astronaut participation as a scientist. The following points were brought out: The astronauts all felt that the pre-flight training period specified by the Principal Investigators was unnecessarily lengthy. They suggested that the training period be adjusted to fit the technical backgrounds of each astronaut. Dr. Michel felt strongly that the ATM experiment philosophy concerning the scientific judgment of the astronaut did not place enough emphasis on the astronaut's role as a scientist. It was requested that a meeting with the Principal Investigators be held soon in order to settle this point. ✓

2. ATM EXPERIMENTS: We are still working on an exact definition of pointing and holding accuracy requirements. The two most demanding experiments are those of NRL and Harvard Observatory. Pointing accuracy is limited primarily by the degree of alignment between the instrument that takes the primary measurement, and the instrument that furnishes the display for the astronaut. Holding accuracy (stability) is limited primarily by temperature effects on the spar. A temperature difference across the spar of 0.015° produces already a bending of 2.5 arc sec, i.e. the permissible stability error. A joint effort is under way between Astrionics, P&VE, and RPL to resolve this problem. ✓

3. LUNAR TRANSFER: MSFC's proposal regarding transfer of lunar activities to MSC will be discussed at the Executive Council Meeting on 10/18. It seems that Mr. Culbertson is quite upset about the potential transfer of a large portion of the program to MSC. ✓

4. EMR: I had another meeting with Dr. Nancy Roman in which we discussed MSFC's proposal for the EMR project. We arrived at a good mutual understanding, and I believe that the payload proposal will receive an approving nod from the Astronomy Subcommittee. A first presentation on EMR will be given to the Subcommittee on October 24. ✓

5. OART REVIEW OF THERMAL CONTROL STUDIES: Members of RPL will attend the OART review on solar simulation and thermal control coatings at JPL October 18 & 19. Mr. Arnett will present a paper on the "Mechanisms of UV Degradation," including in-house and contractual results. Mr. Snoddy will present a paper on Pegasus thermal flight experiments including results of the environmental effect sensor experiment and the status of the thermal coupon recovery from Pegasus C. Mr. Snoddy will also present a paper on the evaluation of the space simulation facility in Bldg. 4331. Recent in-house measurements of the spectral intensity, total intensity, and uniformity of the aerospace solar simulator will be included. Mr. Gates will present a paper "The Development of Thermal Control Coatings," including IIT research results. ✓

NOTES 10-17-66 WILLIAMS

10/17/66

B 10/25

1. Project ABLE: An executive summary session by all 5 Project ABLE contractors was conducted at NASA Headquarters on October 11 for DOD. Mostly civil service personnel attended from DDR&E, RAND, Aerospace, IDA (Institute of Defense Analysis). Headquarters was represented by Gray and Raffensperger; MSFC by Rees, Carter, Lavender, Kromis, Verble, and Kingsbury. Comments from DOD were not sufficient to provide any guidelines for conducting our studies. The meeting was primarily to educate major segments of DOD on Project ABLE. We have a one-hour status report on "what is known to date" about Project ABLE to the Provost Committee on October 26 at 2:00 PM in the Pentagon. The people on this committee are the chiefs (normally Brig. Generals and above) of the various DOD research and development activities. It is expected that another presentation will be scheduled for the Assistant Secretary of Air Force level when the studies are completed in mid-November. I am convinced that the interest in these studies will continue to rise and the pressure on us to establish feasibility (which must be with a high degree of confidence) will increase. Dr. Rees will brief you on his impressions. ✓

2. Advanced Orbital Workshop Study: The RFQ on this study was released to industry on October 7, 1966, and proposals are due on November 7, 1966. Instructions to bidders indicated an estimated level of effort of 27,000 manhours corresponding to about \$400K. ✓

3. Space Station Study: The Donlan Committee (chairmen or representatives) will visit MSFC on Tuesday, October 18 for a full day of "Requirements Review" to make a first cut at coming up with a revised set of "Requirements" for us to crank into the next go-around on the Seamans space station effort. We expect to have the next pass completed and ready to go back to Seamans by mid November. I plan to have an inhouse review at MSFC prior to the Washington meeting. ✓

4. LSSM: Mid-term presentations were held at Boeing, Kent Facility, Seattle, Washington, on October 11-12, 1966, and at Bendix Systems Division, Ann Arbor, Michigan, on October 13-14, 1966. NASA personnel attending these presentations included representatives from MSF and MSC (crew systems division) in addition to MSFC personnel. Both representations included a demonstration of a man in the latest version of the hard-suit working in conjunction with the respective company's LSSM mock-up. The Bendix mock-up was motorized, and the MSC engineer in the hardsuit demonstrated his capability to drive this vehicle. ✓

5. Pegasus: The Pegasus Panel Retrieval Study Form 1138 has been reviewed by the Experiment Coordination Panel (ECP). A compatibility analysis has been asked for and it is expected that John Disher will initiate the action. It is estimated that MSFC will be requested to participate in the compatibility analysis. As soon as this request is received, MSFC will interface with MSC. This work is being done in support of and through Lee Belew. ✓

October 24, 1966



1944
12/15
✓ B 12/16
GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

NOTES
File

Memorandum

THRU : Mr. F. Williams, R-AS
THRU : Mr. H. Weidner, R-DIR
TO : Dr. von Braun, DIR

For 12/4
H. Weidner 12/4

DATE: November 29, 1966

FROM : Director, Research Projects Laboratory, R-RP-DIR

SUBJECT : Transfer of Lunar Activities to MSC

On my Weekly Notes of 10-24-66 (copy attached), you asked about the mechanism for coordinating with MSC the lunar surface tasks which we will continue at MSFC. The purpose of this memo is to answer your question, and also describe the overall situation which exists in regard to the transfer of some tasks to MSC, and the continuation of other tasks at MSFC.

There are some tasks performed in the past years at Marshall that are oriented specifically to lunar application (e. g., Lunar Traverses Analysis, LSSM, Lunar Drill, Lunar Surveying System, Emplaced Scientific Station) and there are other scientific experiment development tasks that could have lunar application as well as other mission applications (e. g., Laser Altimeter, Infrared Spectroscope, Gravity Gradiometer). As you will probably recall, in our meeting on October 3 with you, Dr. Rees, Mr. Weidner and others, we decided not to discuss with MSC the transfer of tasks involving the definition of experiments having broad potential applications. Instead, we would continue our work on these tasks until the basis for an experiment was developed to the point where an experiment could be offered for a particular mission. At that time, it would be decided if the experiment was accepted for the mission or not, and if its development as a specific flight experiment should be started. I would like to emphasize that these experiments can be offered for earth or-
bital and planetary missions, as well as for lunar missions. Thus, we are not totally dependent upon MSC to accept them. In my Weekly Notes of 10-24-66, the tasks that I mentioned to be funded by Mr. Wilmarth are all of this scientific experiment development type (except for the Surveying System, which will be transferred to MSC). So, to answer your question, there is no intention to coordinate with MSC at this time the tasks funded by Mr. Wilmarth, and to ask MSC to make use of our developments. However, MSC is of course aware of our work, and of this potential source for lunar experiments. It is important to recognize that some of these tasks (e. g., IR Spectroscopy) are the natural product of research work in well established fields (in this case,

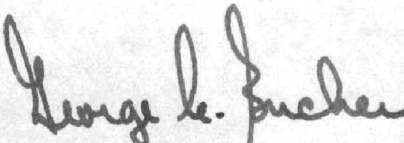
Thermophysics); we expect to continue research in these fields even though a particular applications program, such as the lunar program, may undergo perturbations.

Now, to return to those tasks that are oriented specifically to the moon. In your letter of October 19 to Bob Gilruth we proposed to transfer planning of AAP-type lunar traverses; the Emplaced Scientific Station experiments; and lunar surface geological, geophysical, and geochemical experiments to MSC, and to retain the LSSM, Lunar Drill, Lunar Surveying System and Lunar Flying Device at MSFC. Dr. Gilruth's reply of November 3 agreed with our proposed transfer, except that MSC also wanted the Lunar Surveying System transferred; the LSSM and the Lunar Drill would remain at MSFC as we proposed. Dr. Gilruth's letter stated "If the hardware is required in three to four years, and if present concepts are carried through, we agree that it is appropriate that MSFC proceed in the near future with the development of the LSSM and drill. If, however, the increased payload capability is delayed, or if present concepts and approaches to lunar surface mobility are found to be inappropriate, we would propose a reassessment of responsibility for hardware implementation". I think we should remain in the forefront of NASA planning on lunar mobility and deep drills regardless of the implementation date of the hardware. Very recently, MSC has requested that we also transfer the Lunar Flying Device to them. MSFC's counter-proposal is to continue with this effort until completion of the contract with Bell Aerosystems to examine flight characteristics of the vehicle. A test program at Langley is involved. MSC would participate in this effort and would assume full responsibility after the Bell contract is completed.

We have already furnished copies of all of the final reports and other pertinent information to MSC on the lunar science contracts pertinent to the tasks which were transferred. Since the technical effort on all of these contracts has been completed and the contracts have been or are in the process of being closed out, no actual transfer of the MSFC Purchasing Office contract files was required. The Headquarters approved work statement on the Lunar Surveying System, which we prepared, has been made available to MSC. The transfer has been completed, and we have informed Mr. Bob Vale (Bob Piland's deputy) that we stand ready when requested to provide MSC any further assistance that may be required in continuing the activities which have been transferred. In the near future, the responsible persons at MSFC will contact Bob Piland to establish a mechanism for coordinating with MSC our continuing activities on the LSSM, the Moderate Depth Drill, and the Lunar Flying Device. The Advanced Systems Office in R&DO, in concert with the Saturn/Apollo Applications Program Office in IO, has been given action responsibility to

establish working arrangements with MSC, since ASO and Test Lab will be the primary elements involved in these continued efforts. RPL will maintain contact with Bob Piland's group regarding scientific experiment development. Bob Vale said that he wished "to study in depth" the material we sent him on our lunar work, and that we should not make further presentations until he has done so.

I hope that this note will provide a satisfactory picture of where we stand now in this matter. If more information is desired, please advise.


for Ernst Stuhlinger

Enc:

As stated

cc:

DEP-T, Dr. Rees

R-DIR, Mr. Weidner

R-DIR, Mr. Cook

R-AS-DIR, Mr. F. Williams

R-TEST-DIR, Mr. Heimburg

R-ASTR-DIR, Dr. Haeussermann

I-S/AA, Mr. Belew

B 11/9

1. LUNAR STUDIES: Mr. R. Wilmarth, Planetology Program Director, OSSA, discussed with us on 10/21 MSFC's continuing effort in lunar studies funded by OSSA. As a result of our discussions, Mr. Wilmarth expects to fund our work as follows: Radar Altimeter Studies - 50 K; Laser Altimeter Studies - 50 K; IR Spectroscopy - 50 K; Gravity Gradiometry - 60 K; Extended Geophysical Surveys - 15 K; and Surveying System - 100 K. Although OSSA withdrew approximately one-half of our FY-66 funding I believe the conclusions reached concerning our continued effort in the Lunar Science Program will be agreeable to MSFC management. Due to Mr. Wilmarth's severe scarcity of money, he wishes to support us in those areas in which we can contribute inhouse support. MSFC's ultimate participation will be as "Principal Investigators" or "Co-Investigators", but the above arrangement permits us to continue our studies on a basis much broader than that for the mere preparation of a flight instrument. *E.S. Let's just make*

2. GRAVITY GRADIOMETER: One of the instruments which we will continue to develop, and which may lead to a "Principal Investigator" role, is a gravity gradient sensor to be used on an orbiting satellite. It appears that a sensitivity of $10^{-10} \text{ g m}^{-1}$ can be obtained. The problem is not so much in the development as it is in how to calibrate and use the instrument once it is developed. The prime objective will be to identify localized gravity anomalies. The secondary objective will be to define the gravity field as an independent method for comparing with the orbital variation method now being used. *sure that MSC, now plainly in charge of total lunar surface mission profiles, is really ready to use our stuff. I can't force it in at a later time if it is not properly coordinated with them from the outset.*

3. EMR SATELLITE PROJECT: Following our EMR presentation and discussion at the OSSA briefing on 10/20, we had a meeting with Dr. Roman in which we further discussed her view of the EMR proposal. The major point of contention is the fact that since the EO1 cancellation, several EO1 experiments appear more desirable to be flown on EMR than some of the experiments we originally selected for EMR. It appears, though, that a mutually acceptable solution can be found. One possibility is the addition of one or two experiments to EMR. *What mechanism exists for this coordination? B*

4. SCIENTISTS AT MSFC: As a follow-on to Dr. Shelton's presentation to the MSFC Board and the subsequent discussion on 10/21, we are writing now two papers for internal consumption, one on the mechanisms, formal and informal, to attract and acquire NAS Fellows for MSFC Laboratories, and one (to be worked out jointly by RPL, Purchasing, and other MSFC elements) containing suggestions on how to improve the environmental conditions for practicing scientists at MSFC. We feel that two requirements must be met in this effort: (a) the scientist must be able to retain his scientific quality, creativeness, and efficiency over a period of years and (b) his work must be of value, directly or indirectly, to MSFC's present and future work programs.

5. RADIATION PHYSICS WORK: Mr. Burrell of this Laboratory has been selected to serve as a member of the Shielding Division Program Committee of the American Nuclear Society.



draft 11/18

MISSION OPERATIONS OFFICE *988*


MEMORANDUM

11/17/66

TO: DIR, Dr. von Braun

SUBJECT: Support Requirements Documentation
for the Voyager Program

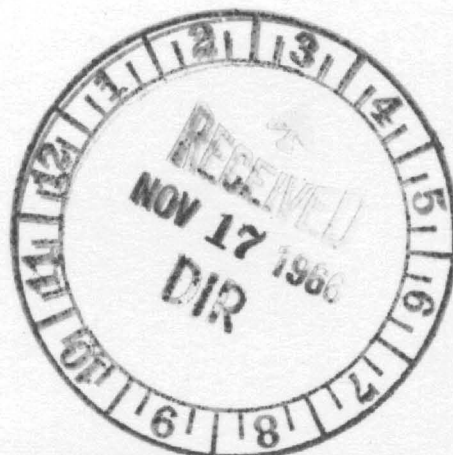
In reference to your remarks on my Notes 10/24 and 11/7 (copies attached), I am enclosing Mr. Christensen's draft "Support Requirements Documentation for the Voyager Program". My answer to Christensen (also enclosed) is intended to reflect your guidance. I assure you, nobody in this office will rock the boat.

F. Speer 

F. Speer

This is a very fine reply.

Thanks B 11/18



NOV 17 1966

I-MO-MGR

Mr. E. E. Christensen
Director, Mission Operations
Office of Manned Space Flight
National Aeronautics and Space Administration
Washington, D. C. 20546

Dear Chris:

Since your visit here at MSFC Harvey Golden and I have discussed your draft letter "Support Requirements Documentation for the Voyager Program". While we believe to fully understand the reasons for the position you have taken, I would like to offer the following comments for your consideration before you prepare the final correspondence for Dr. Mueller's signature.

From what I understand, significant changes in the detailed management of the Voyager Program within NASA are now being discussed and negotiated and will undoubtedly be reflected in procedural modifications across the board, and will probably not be restricted to the Support Requirements Documentation. I believe we can expect OSSA to come forward with an overall management plan giving due consideration to the increased involvement of other Headquarters offices and field Centers. It may be wise to wait for this overall management plan before trying to address an isolated and perhaps comparatively minor aspect such as Requirement Documentation.

Similar considerations appear to apply to the potential utilization of the Mission Control Center - Houston. As we are unable at this time to identify any actual need for real time command decisions during the launch vehicle power flight we should perhaps avoid introducing additional



complex interfaces. On a somewhat related question, and in the interest of mission continuity I would consider splitting the Mission Director responsibility into two phases (and two persons) principally undesirable and in fact contrary to what we practice in the Apollo Program.

In offering the OSRO approach I feel that insufficient reasoning is given why JPL should change from a system that has obviously worked to their satisfaction in the past. While it has obvious advantages for us using our approach we must not ignore the fact that OSRO is not yet a NASA-wide institution and that JPL/OSSA might be quite concerned about the prospects of losing control over the requirements coordination unless we can quote some obvious and convincing advantages to them.

As I understood your request, these comments are more my personal reflections than a fully coordinated MSFC position. If you feel that an OMSF letter is definitely required at this time I would be glad to furnish you an MSFC position on your final draft.

Sincerely yours,

Original Signed By

Dr. F. A. Speer

F. A. Speer

Manager, Mission Operations Office

B 11/3

10/24/68

1. VOYAGER MISSION OPERATIONS: A meeting was held on 10/21 with Renzetti and Blomeyer of JPL and the Saturn V Program. JPL will ask MSFC to submit any and all ground support requirements for Saturn V - Voyager missions directly to JPL rather than follow our present established route via OSRO. Before accepting JPL's proposal we need to discuss this question with several Headquarters Offices. It appears that JPL may be underestimating the possibility of conflicting and multiple demands on the combined NASA-DOD ground support elements. (This aspect favoring one central point of commitment such as OSRO). Also discussed with JPL was the possible utilization of LIEF/HOSC for L/V support to the JPL Mission Director during the pre-injection phase. We conducted a tour of our facilities and found the JPL representatives very responsive to using these existing capabilities.

2. RANGE SAFETY COMMANDS FOR ALTERNATE MISSIONS: In a meeting on 10/17 at PAFB Range Safety Personnel confirmed that there is no objection on their part to use the range safety command system on missions 501 and 502 for mission contingencies after insertion. The specific applications would be cut off for overspeed at insertion and inhibit second burn to permit safe S/C separation. These commands apply only to extreme contingencies and are governed by Mission Rules now being prepared.

3. ODOP TRACKING FOR IMPACT PREDICTOR: KSC has conducted studies for ETR (Eastern Test Range) on applying ODOP data for impact predictions. ODOP tapes from past Saturn flights have been used in simulations; supposedly verification of the technique and practical aspects have been established. The ETR is interested in an "all weather" system to provide necessary accuracy in the flight period affecting the area close to the pad. This activity could have some bearing on future MSFC decisions concerning the deletion of ODOP in the interest of operations cost effectiveness. It is expected that this potential ODOP utilization will be reviewed by Mr. Christensen in the near future.

4. LAUNCH MISSION RULES: KSC has issued a new procedure for developing and coordinating Launch Mission Rules (LMR). Inputs submitted by MSFC and MSC now must go through the cognizant KSC element and will need some justification as to their validity. Gen. Shinkle will retain his responsibility as the official inter-Center point of contact. Although we are not asked, the LMR procedure appears to be acceptable and points to the increasing importance given to this effort by KSC.

F.S.
I guess in view of OSSA's recent decision to establish a Phillips-type Voyager Program Office in Pasadena (on JPL's premises but not as an element of JPL) they will soon add an operations or missions support element to that office. This would then be the place for us to communicate with. In the meantime I suggest to fully abide by JPL's desires even if you have reservations. In other words, don't rock the boat now.

B

DRAFT - EEChristensen/fc 11/1/66

TO : S/Dr. Newell

FROM : M/Dr. Mueller

SUBJ : Support Requirements Documentation for the Voyager Program

While the Voyager mission is still quite far down stream in time, there is a current requirement for certain basic agreements as to how operations will be conducted and inter-organizational operations support will be coordinated.

Preparation of the Voyager Program Development Plan and other preliminary planning is in progress at the present time. In order to make this effort most effective, it is timely that basic concepts of operations be established.

For manned space flight missions, as I'm sure you are aware, we appoint a Mission Director who has responsibility for the overall planning and conduct of the mission. For the Voyager mission, this concept would be modified in that OMSF responsibility would terminate with separation of the spacecraft from the launch vehicle. Without belaboring the semantics of what we call him, I think we would benefit by continuing the practice of identifying an individual within OMSF with those responsibilities, thereby, capitalizing on all of the procedures, command channels and lines of communication that have been developed during the conduct of prior Saturn V missions.

With regard to launch vehicle control, it may be that in the time period of the Voyager mission that we will have developed sufficient confidence in Saturn V systems that the launch through injection phase of the flight can be planned as a completely automatic process without the provision for a state vector or targeting update. However, should insurance against aborting the mission because of such anomalous events as single engine failures or early cutoff be desired, we would plan

to control the lift-off to injection phase from the MCC in Houston since it is only from this facility that we have the capability of generating real-time commands.

Another subject that deserves attention because of the long lead times involved is the process by which operations support requirements are generated, collated, coordinated, and validated. Over the last two years, OMSF and OTDA , in conjunction with the DOD Manager for Manned Space Flight Support Operations, have developed an operations support requirements format called the Program Support Requirements Document (PSRD). This same basic format is presently being reviewed by a working group which has been established by the DOD Range Commander's Council and will potentially become the format used by all DOD Ranges. Since Saturn V operations support requirements will be maintained current in this format and Voyager requirements have yet to be developed, I suggest that the PSRD be adopted as the format for the overall Voyager Program.

For manned programs, we have established here in Washington, D.C. an Operations Support Requirements Office (OSRO). In this office, representatives from OMSF, OTDA, and all operating and supporting organizations are located. It is here that requirements are received, collated, conflicts and redundancies are resolved, and after a validation by program elements, published and forwarded for implementation. Since Voyager will also be a program with a number of inter-center implications, a similar approach might be beneficial using the current OSRO organization as a basis.

10/24/66

NOTES 10/24/66 GEISSLER

Harry Dahm ✓

1-27-67

B 1/19

12-

1. NASA Research Advisory Committee on Space Vehicle Aerodynamics:

On Oct. 17 and 18, Mr. Dahm and I attended a meeting of the above committee at MSC. Several presentations were made which confirmed and emphasized my previous presentation on the need for exploration of High Reynolds Number problems. In addition to problems for large launch vehicles, examples were also quoted pertinent to the development of subsonic, transonic, and supersonic aircraft (especially with respect to the chord-wise location of shock waves on wings which is critically dependent on Reynolds Number). Mr. Dahm reported about our design studies on a Ludwig Tube type facility which is economically superior to a blow down tunnel. A somewhat more modest facility than our recently proposed Hi-Re-No facility could eventually be built for as little as \$250-500K. It was also pointed out by Dr. Smelt, that the quality of the flow in this type facility could be expected to be better than in a conventional blow down tunnel. A resolution was finally passed (with only one dissenting vote) that the committee endorses the need for simulation facilities of higher Reynolds Number. Mr. Pearson from OART, who is our official contact in matters of this facility, told me privately that he feels we at MSFC could and should go ahead with a pilot facility of the cost level mentioned above which would not require congressional approval.

2. XVIIIth International Astronautical Congress: The paper entitled "Adaptive Guidance for Saturn Vehicles," prepared by Mrs. D. Chandler, Mr. W. Deaton and myself, which was presented by Mr. W. Deaton at the above meeting, was very well received by the audience of approximately 200 people. The presentation lasted about 14 minutes, and the question and answer period took about 10 minutes. Perhaps the highlight of the presentation came at the end of the question and answer period when Roland Cosaert (a representative of E. L. D. O., European Launch Development Organization) asked for the floor and gave about a 5 minute talk on how well the iterative type formulation worked on their radio guidance system. A copy of our paper has been sent to you. ✓

3. Gravity Simulation Workbench: Based on a suggestion by Dr. Mueller, a "gravity simulation workbench" experiment has evolved as a possibility for the S-IV Workshop. As principal investigators by appointment from R-EO, we are preparing to conduct preliminary tests and develop the necessary documentation for submission of the experiment to the MSFEB in January 1967. Briefly, the experiment is to evaluate the practicability of using aerodynamic drag as a substitute for gravity when assembling devices. An electric fan underneath a perforated work surface provides the required unidirectional gas flow which is to settle and hold loose parts and tools against the table. ✓

4. Fourth Annual DOD/NASA/FAA Symposium on Navigation, Guidance and Control: This symposium was held Oct. 11-12 at WPAFB, Ohio, and featured presentations on navigation, guidance and control goals of the military, NASA and FAA, by the directors of research in these fields of the various agencies. Among eight invited presentations, Mr. J. R. Redus, of our Astrodynamics and Guidance Theory Division, presented NASA's technical paper on launch vehicle control problems and research. A copy of this paper has been sent to you. ✓

Harry - Before we bring the Boss in for a briefing - when he may make a quick decision - we should get together with Ernst Geissler, Dave Sullivan, Winton. We need to be careful about this facility (or equipment) as it has been turned down by Headquarters before.

Ship 11/14

W. Kly notes

Stop
+
Please
arrange
a
briefing
with
Harry
let's see
what we
can do,
officially and
otherwise
B

OFFICE OF DIRECTOR - MSFC

| CODE | NAME | INIT. | <input type="checkbox"/> ACTION | <input type="checkbox"/> INFORMATION |
|------|----------|-------|---------------------------------|--------------------------------------|
| | 10-24-66 | | | |
| | | | | |
| | | | | |

REMARKS

Shepherd has scheduled
a meeting on this
subject Friday at
8:30, Rm. 915

Poland
Would ~~Mr. Lamb~~ be the
right legal man to invite
Guthrie is on TDX

| CODE | NAME | DATE |
|------|------|------|
| | | |

B 11/2

NOTES 10/24/66 BALCH

10/24/68

S-II-1 Testing - LH₂/LN₂ tanking was accomplished on 10/17/66, and all major objectives were met. After repair of minor insulation damage resulting from the test and installation of larger exit lines in the purge circuits around the LH₂ feed duct connections, no further constraints are anticipated to static firing, which is now projected for 10/27/66. ✓

S-IC-T Arrival - The S-IC-T stage arrived at MTF on 10/23/66, as scheduled and has been off-loaded and placed in the S-IC Booster Storage Building. ✓

S-IC Test Stand - The Boeing Company has completed the structural load test on hold-down arms of the B-2 position. Thrust load, rebound load, and tangential loads were simulated. No structural failures were noted, and no problems were encountered in performing the test. This is the first integrated test to be performed on the S-IC test stand. The Corps of Engineers deserves congratulations on having accomplished so successfully the installation of these very critical attachments (hold-down arms) within such critical tolerances and time schedules. ✓

MTF LOX Barges - In regard to the question you had on this item in my notes dated 9/19/66, it has been established with a fair degree of certainty that NASA is not responsible for the damage sustained by the highway bridge in Florida as a result of the collision involving MTF LOX Barges #4 and #5 on 9/16/66. The matter is a private one to be settled between the Florida State Highway Department and the insurer of the contract towing company. ✓

10/24/66

B 11/2

ATM MOCKUP: Agreement has been reached with Astrionics Laboratory on the need for early definition and fabrication of a full-scale ATM mockup. It will hopefully be available for the OSSA Senior Council meeting in January.

ORBITAL WORKSHOP - DOD/MSD/MSFC MEETING: A meeting was held with DOD Experimentors and their prime contractors at MSFC, October 18 and 19. This session was oriented toward defining specific requirements and integration schedules. DOD will probably ask for waivers concerning schedules, parts and materials, quality specifications, and documentation, especially in cases where the DOD experimentors are now using approved MOL procedures, specifications, etc. DOD accepts the MSFC Orbital Workshop Experimentors' Handbook, SAA 209 as the official document setting forth NASA requirements for DOD sponsored experiments.

NEUTRAL BUOYANCY: A neutral buoyancy mockup of the Orbital Workshop will be constructed for test at MSFC. The mockup of the quick opening hatch will be available by Dec. 1, 1966. The complete mockup will be ready by Dec. 15, 1966.

PROJECT THERMO: There is considerable effort being conducted by the Labs and their contractors on Project Thermo. This effort includes mission planning integration and detail experiment engineering. A recent presentation to the MSFEB Working Group indicated that a request for a compatibility analysis would be forthcoming. We are working with Dick Cook to give you an overall picture of mandatory and desired activities versus resources in early November.

APOLLO APPLICATIONS MISSION OPERATIONS: A series of working sessions has been started to define mission operations and flight operations requirements of AAP. The facilities of the world wide tracking network, communication facilities between Centers and the availability of the HOSC and Launch Information Exchange Facilities (LIEF) functions are being evaluated for use in support of the various AAP missions.

INTEGRATION CONTRACTORS QUARTERLY REVIEWS: Presentations on results of the first quarter will be made Oct. 26 by Martin-Denver and Oct. 28 by Lockheed Missiles & Space Company in the 10th Floor Conference Room, Bldg 4200.

ATM CMG PROCUREMENT ACTION: A target of Nov. 1 has been set for hand-carrying the ATM CMG procurement action to NASA Headquarters for approval. We are working closely with Astrionics and Purchasing to assure that this action gets special attention here and at Washington.

The FY 1967 ATM funding, earmarked presently by NASA Headquarters, clearly shows a major problem in relation to projected requirements. This problem is being discussed with Mr. Cook to assure that internal MSFC coverage is established.

10/24/66

J-2 ENGINE There was a successful 20 second test at AEDC 10-18-66. This was the first test of the flight vehicle simulation program. This particular test simulated the nominal S-IVB engine condition for Saturn 204. ✓

S-IVB stage 207 completed a successful acceptance test of 446 seconds 10-19-66. ✓

The 85th J-2 engine was accepted by the government 10-17-66. There are a total of 155 engines planned for the 12-vehicle Saturn IB and 15-vehicle Saturn V Program. A decision to either proceed on AAP procurement or to stretch today's Apollo program is required in January to preclude a gap in the J-2 Production Program. ✓

As a result of Saturn IB flights 201, 202 and 203, it was determined that the engine turbine exhaust duct does not cool down after shutoff as expected. Rocketdyne immediately implemented a test program to analyze the efforts of the hot duct on engine start. In one day Rocketdyne ran nine 77 second tests and one 253 second test on a single engine in this investigation. The engine was restarted in one instance in 29 minutes. The investigation will continue until all concern is eliminated. ✓

H-1 ENGINE Borescope inspection of the turbopump lube seal sleeve nut has been completed on all H-1 engines in vehicle SA-204 and they were found to be in satisfactory condition. ✓

The Flight Worthiness Verification Engine Test Program has been completed and the data is being evaluated. Additional tests will be conducted on this engine to investigate the thrust shift problem. ✓

F-1 ENGINE Rocketdyne has found three turbine manifolds which were cracked in the internal diameter of a torus directly beneath the fillet weld on the outside diameter for the support structure. The cracks were found during the fabrication process prior to green run, and at least one is repairable. No delivery schedule impact is anticipated. Investigation is continuing. ✓

A number of random incidences of leakage in the hydraulic control lines resulted from fatigue cracks adjacent to the fillet weld in the parent tube material. A significant contributor to the fatigue cracks is the increased preload due to line misalignment. An engine field inspection request (EFIR) has been issued by Rocketdyne to inspect, align, and dye penetrant check for cracks on the offending hydraulic control lines on SA-501 -505. Inspection and realignment has been completed on SA-502 and 503. Since certain hydraulic lines have exhibited a lower fatigue life than desired at the weld joint, an improvement program has been initiated by Rocketdyne as a backup to the present design. ✓

NOTES 10, 1966 CONSTAN

10/29 JTB

B 11/5

Nothing of special significance.

NOTES 10/24/66 FELLOWS

B 11/2

958 10/24

1. AAP Integration Ad Hoc Facilities Committee: This committee, consisting of members from the laboratories, F&D Office, and Industrial Operations and chaired by myself, was formed at the request of the IO AAP Office in mid-July to provide information to Martin and Lockheed for their Phase C AAP Integration Studies relative to facility capability and availability at MSFC. The committee met on several occasions with each contractor and furnished information as requested. Based on that information, the contractors completed the Preliminary Facilities Investigation results and submitted those reports to IO last week. This committee, having completed its initial assignment, will assess the reports or other contractor activities as requested. ✓

2. Technical Review of S-IVB 501: In response to Mr. Rees' request for a technical review of the S-IVB 501, a presentation has been scheduled for Tuesday, October 25. During the dry run, which Mitch Cash of my office conducted with the laboratories last week, no new problems were identified; the presentation will emphasize panel flutter, component qualification, and alternate missions, which have been continuing problems. ✓

NOTES 10-24-66 GRAU

10/24/66

B 11/9

Nothing of significance to report this week.

10/24/66

B 4/9

1. LOCKHEED SUPPORT FOR ATM: A number of discussions with Lockheed and I-S/AA recently have led to the identification of many areas wherein support to the baseline configuration of ATM will be provided by Lockheed under their Phase C Integration Contract. Significant areas of support include the pointing control subsystem, instrumentation/communications subsystem, thermal control subsystem, and technical management planning/documentation. Lockheed has begun to provide this support which should prove highly beneficial. This work is directly applicable to the LM Ascent Stage/ATM Half-Rack Configuration and could be converted appropriately once a Headquarters configuration decision is made. ✓

2. ATM CONFIGURATION: An ATM configuration decision is urgently needed to allow:

→ We have it, as of 11/9 B

- a. Long-lead-time item definition and procurement.
- b. In-depth investigation of attitude control requirements - our manpower in this area does not permit the thorough investigation necessary for all the configurations under consideration.
- c. Detail design implementation to keep schedule.
- d. Workload distribution planning in relation to other commitments. ✓

10/24/68

B 11/9

F-1

Test F-W-053 was conducted on October 21, 1966, with F-1 engine S/N F-4T2, on the West Area F-1 Test Stand. The Test was terminated by the LOX pump bearing jet pressure redline observer prior to the planned duration. This pressure (instrumentation indication) decreased to 0 due to the failure of the tubing to the transducer. Primary purpose of this test was to determine the baseline performance for a series of test to investigate excessive gas generator chamber pressure oscillations (buzzing). ✓

S-1C

The S-1C-3 stage propellant load test is scheduled for October 26, 1966. The acceptance firing will be performed approximately one week later. ✓

S-IVB (SACTO)

An apparently successful full duration 447 seconds acceptance firing was conducted on the S-IVB-207 vehicle on Wednesday, October 19, 1966.

Cutoff was given by the computer on a signal from the LOX tank depletion sensor. Approximately 0.95% LOX remained onboard at cutoff. There were no apparent problems and preliminary data evaluation revealed no problems. ✓

S-11-1 (MTF)

A chamber chill test from the A-7-71 will be conducted prior to the first firing since the level of LH₂ apparently was not sufficient to cool the helium to specification requirements. A firing is now scheduled for Thursday, October 27 1966. ✓

10/24/68

CONVERSION PROBLEM - THIRD GENERATION COMPUTERS: Our most serious problem in converting to third generation equipment now appears to be in the business applications area. The two major reasons are:

1. A rapid build-up of new business and management data processing systems since the original specifications were drawn up, resulting in a substantially larger number of programs to convert than was originally expected.
2. Technical difficulties in moving from the IBM 7010 Autocoder language to the Univac COBOL language.

MSC, Houston, is now experiencing similar problems in their conversion from IBM 7010 to Univac equipment. They have found it necessary to extend the contract of a special conversion group, and we are planning to allow them 1-2 hours each night on one of our 7010 computers since theirs will be removed in the near future.

We are examining a number of alternatives to solve this conversion problem, including a drastic curtailment of service and additional programmers for the one-time conversion effort. ✓

NOTES 10/24/66 JAMES

10/24/66

B 11/9

NOSECONE FOR AS-212: Last week we received clarification from Headquarters on the responsibility for the nosecone for AS-212. MSFC will manufacture and furnish the nosecone. MSC will fund for the nosecone and has included this requirement in their FY 68 budget. ✓

R&DO FY 67 OBLIGATIONS AND COSTS: Our R&DO obligations and costs through September 1966 are both running considerably behind schedule. They are approximately 32% behind in obligations and 33% behind in costs as listed below. All concerned should press to identify genuine requirements and initiate action to obligate expeditiously. ✓

| | <u>OBLIGATIONS</u> | <u>COSTS</u> |
|--------|--------------------|---------------|
| Plan | 4.9M | 6.1 M |
| Actual | 3.3M | 4.1 M |
| DELTA | <u>-1.6 M</u> | <u>-2.9 M</u> |

10/24/66

B 11/2

Experiment Presentations to OMSF - MSFC presented to the OMSF ad hoc experiments committee briefings on Project THERMO, AROD, the hydrostatic gas bearing experiment, and the non-metallic materials test experiment. The results were:

1. The hydrostatic gas bearing experiment was accepted for OMSF sponsorship. ✓

2. The non-metallic materials test experiment was tentatively accepted, with recommendation that MSFC advise MSC of the proposal and attempt to incorporate MSC requirements for tests of suit materials. Also, desired procedure of test and validity of environment measurements to be re-evaluated by MSFC. ✓

3. AROD was referred to OTDA for possible sponsorship. OMSF will sponsor if user requirements are made firm. ✓

4. THERMO will be accepted for OMSF sponsorship when ready for final presentation to MSFEB. Committee (Reiffel) suggested that "opportunity announcement" - similar to OSSA practice on scientific payloads - be considered in order to line up additional (or alternate) experiments from industry for first and follow-on payloads. Lord stated that OMSF could not assume funding obligation for experiment this fiscal year. ✓

B, W, RSG, to keep moving? B

Material for Congressional Hearings - The Research Programs Office is currently identifying and collecting exhibits and material to be provided to OART sub-program offices for use during congressional hearings. Are there areas which you would like stressed? ✓

→ 1st class art work and full-scale mockups of all experiments and total "Kluge".

NOTES 10-24-66 KUERS

10/24/66

B 11/2

ME Laboratory Electron Beam Welding Experiment for the Orbital Workshop (209):

The electron beam experiment is entirely self-contained and designed to be performed inside a sealed box so that the device can be operated while inside the relatively safe S-IVB five psia environment. An additional experiment, the exothermic tube brazing experiment, is contained in the lid of this box. High vacuum is provided by attaching the box to the LH₂ vent line (through a high vacuum valve) to space vacuum outside. The astronaut will start the welding and camera recording simultaneously. He is protected from molten puddle splatter, from X-ray radiation, and from the hazard of inadvertent puncture of his suit by beam impingement by the walls of the box. ✓

The MSC electron beam welding apparatus as yet lacks a power supply and is designed to be hand held--a practice we consider highly questionable until we learn more of the puddle physics and of other problems involved. This experiment was discussed at length on October 7 with the appropriate personnel of Dr. Faget's E&D group. When the offer of their perhaps co-sponsoring our experiment was made, they declined politely, but promised to cooperate in assisting us to make the 209 flight, taking the position that their approach, since it still lacks a power supply, constitutes a much longer range program and would be advocated for a later flight. They also conceded that in the event our experiment proves that the puddle physics make welding impossible, they naturally would want to be the first to know. In summary, we now enjoy a good working relationship with MSC and plan to continue in this cooperative mode. ✓

BMS
9/8/24

LUCAS

1. AS-209 WORKSHOP: (Reference NOTES 9-26-66). On October 11, 1966, a meeting convened at MSC between technical personnel of both Centers to exchange existing data and ideas on the habitability and lunar floor simulation experiments. Since we had several clarifying phone conversations with the MSC contact person (Ted Hays) prior to the meeting, it was understood by all parties that MSFC is furnishing the Hotel and Laboratory facility and MSC is providing the habitability active systems as waste management, food preparation, hygiene and medical systems, etc. We will integrate these into the overall facility. The same goes for the laboratory work benches, etc., of which the Lunar Floor is one (if we are really going to fly this experiment). MSC had prepared several pages of habitability criteria for us. Direct contact between our designers and the principal investigators was sanctioned. The whole meeting was cooperative. Principal participants from MSC were Bob Thompson, C. Johnston, Dr. Fedderson, Ted Hays and others. MSC does not have any designs or contacts in these areas yet, only ideas and sketches as they were shown at the MSFEB.

A three-phase test procedure for the in-house designed and manufactured quick release manhole cover has been completed. The test program will provide evaluation of the operability of the quick release mechanism assembly procedure, qualification of the manhole cover assembly, seal, and adapter ring under operating pressure, cryogenic and vibration environments.

A small experiment simulating some typical Astronaut task in the early phase of workshop activation is to be incorporated in the Gemini-12 flight. It will be mounted in the aft end of the Service Module. The experiment flight hardware has been shipped to McDonnell Aircraft Corporation at KSC for integration into the Gemini spacecraft.

2. EXPERIMENTS REVIEW BY OMSF: On October 17, 1966, Doug Lord called a review meeting on some flight experiments. Our #8 (Mechanical Properties Measurements) and Project Thermo were among those. Experiment #8 consists of an apparatus to do tensile tests in space on plastic materials which are exposed to the actual space environment. It requires Astronaut participation to operate the system and recover the samples. This kind of information is needed for large space structures, deflectors-ABLE, etc. The reception was very favorable and it was suggested to incorporate an approved MSC experiment in this area into ours. We will coordinate. The presentation on Project Thermo was essentially identical to the one given to you. Again, the reception was favorable, and Doug Lord intends to bring this to Dr. Mueller's attention soon. Hopefully, a positive course of action will be established towards a mission assignment thereafter. We believe the point was made for the necessity of these experiments prior to the design of future long duration flights and operations in space. Dr. Reiffel also attended.

3. S-II VIBRATION TESTING: S&ID reviewed the status of change order 351 on October 19. The schedules to complete the subject change order are very optimistic. We are doubtful about the timely completion. It was very alarming that the contractor repeatedly mentioned a possible impact on our test program by expected additional Apollo test requirements to be established shortly by Headquarters. It is strongly recommended that a top priority be established at S&ID for the completion of change order 351.

4. S-IB - S-IVB STAGE: The aft skirt passed the ultimate structural load test (140%) at Huntington Beach, on October 13. The failure load test was successfully accomplished October 19. Failure occurred in the test fixture at approximately 225% of Max Q bending moment. This test completes the verification of the S-IVB stage for AS-501 loading conditions.

B.L.
Request
a short
briefing.
Do you have
a wooden
model? If
not, I
suggest we
make one
B

1.O.
Sam Yarkin
What's this
all about?
B

→ 2

10/24/66

B 11/2

1. PROGRAM REVIEW - MSF has decided, although they have not notified us officially, that they will not require a POP 66-4. In lieu of this submission they are considering a program status review during the Executive Session after the November 22 Management Council Meeting. This review would be oriented toward the progress being made by the major prime contractors in meeting MSF's POP 66-3 target costs and from this the development of total fund requirements for the remainder of FY 67. From this review MSF would decide on any redistribution of FY 67 funds. MSFC attendance at this Executive Session would probably be limited to Dr. von Braun, Dr. Rees, Mr. Gorman, and General O'Connor.

2. TITAN III/MOL STUDY REQUESTED BY BOB - This past June we informed you of a BOB request to NASA Headquarters to study the possible utilization of Titan III/MOL hardware for AAP.

MSF has completed this study and the results were reviewed by Dr. Seamans on October 6. The study included such combinations as T-IIIM/CSM, T-III/Gemini B (Baseline MOL) and T-IIIM/MOL uprated. It appears that the results concluded that although the T-III is a cheaper vehicle, when required to perform the same missions, a larger number of T-IIIM/MOL vehicles is required. Therefore, the cost savings are small and would not be fully realized until the mid-70's.

Dr. Seamans approved the study results for forwarding to BOB.

H.M.
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a skunk
B

NOTES 10/24/66 RICHARD

10/24/68

No submission this week.

B 11/2

NOTES 10/24/66 RUDOLPH

B_{11/9}

10/29/68

1. S-IC-3 Stage - Reference Notes 10/17/66 Rudolph, item 3 (copy attached) which announced that acceptance testing of S-IC-3 had been rescheduled from Thursday, 3 November 66 to Tuesday, 29 November 66, to permit incorporation of late changes prior to acceptance testing. Further investigation has revealed that only 4 of 22 changes could be incorporated prior to a Tuesday, 29 November 66 firing and that these 4 changes have no effect on the acceptance test plan. Therefore, the firing date for S-IC-3 has been rescheduled for Tuesday, 8 November 66. ✓

2. S-II-1 Stage Status:

- Data resulting from tanking tests is being evaluated.
- Insulation inspection and repair in process. "
- LH₂ and LOX barges are in dock at MTF.
- 1st acceptance firing forecast for Thursday, 27 October 66. ✓

Attachment: DIR, I-DIR and R-DIR's copy only.

NOTES 10-24-66 WILLIAMS

10/24/66

B 11/9

1. OMSF Prospectus: Dr. Summers (Ed Gray's shop) has set November 10 as the target date for a complete draft of the OMSF Prospectus. We have been requested to give major support in two areas: (1) Earth orbital definition, and (2) integration of the overall program into at least three alternatives. In order to be responsive, we have asked Dr. Summers to come down next week for a working session. ✓

2. MTA: The Bendix MTA has completed hard sand slope test. The vehicle performance was satisfactory, except the vehicle was unable to negotiate the 60% longitudinal and side slopes. Steering test in loose sand has been completed and the minimum turning diameter was 109 feet. The vehicle would not scuff steer in loose sand beyond approximately 20 degrees due to sand build-up at side of wheel.

The General Motors' MTA arrived at the Yuma Proving Ground on Monday, October 17, 1966, and is being calibrated for test. Test will begin Friday, October 21, 1966. The GM/MTA will undergo the same test program that the Bendix/MTA has completed to date, and, thereafter, both vehicles will be tested simultaneously. ✓

3. S-IVB Ground Equipped Workshop: Members of the Donlan Committee on space station requirements visited MSFC on October 18, 1966. The Donlan Committee (Requirements Task Team) met at MSFC on October 18. They were briefed on MSFC and MSC space station tasks and activities and coordination was accomplished with the individual panel chairmen in the various scientific and technological disciplines involved. During the discussion, the necessity for utilizing some of the five-year space station requirements for the Ground Equipped Workshop (GEWS) was noted. The Donlan group indicated interest in this approach and it appears that these requirements will be a significant assist in establishing the experiment packages that can best be used in conjunction with the GEWS. A final Committee presentation to Dr. Seamans is scheduled for November 15. ✓

4. Voyager-Saturn V: We had a meeting of MSFC/JPL Engineering Implementation Panel (EIP) here on October 20. Ted Pounder (JPL Co-Chairman) and nine others from JPL attended, plus Les Fero from OMSF and Earl Olahn from OSSA-Voyager. ✓

The shroud design and planning effort is probably the most significant Marshall effort under discussion at this point. ✓

OCT 31, 1966

NOTES 10/31/66 BALCH

11/1 954

B 11/2

S-II-1 Testing - As a result of discovery of failure of foil seal installed in bottom of LOX tank of S-II-3 stage, LOX tank of S-II-1 was entered on 10/28/66 to check integrity of similar installation. Inspection revealed "bulging" of several of the seal sections and pinholes in foil and debonding of edges which would have permitted LOX to come in contact with the noncompatible NARMCO underneath the foil on subsequent tanking. MSFC and S&ID personnel are taking action to provide for repairs to permit a safe static firing as soon as possible and an acceptable fix for launch. Further coordination with Douglas on their experience with the same type of seal application is planned today. Insulation repairs required after LH₂/LN₂ tanking were much more extensive than originally estimated but have now been completed. Installation of larger exit lines in purge circuits around LH₂ feed duct connections to increase flow capacity of system in event of leakage has also been completed. ✓

S-IC-T Activities - Receiving inspection and complete configuration verification is underway with the stage in a horizontal position in the S-IC Booster Storage Building. Spares provisioning for the S-IC-T to support in-stand test activities starting in early December is being carried out by the Boeing Company in accordance with the terms of their contract. ✓

Damages from MTF LOX Barge Accident on 9/16/66 - An injunction is being sought in the Federal Courts in New Orleans by the insurance company of the towing contractor involved (Gulf Coast Towing Company) for exoneration from or limitation of its liability for any damages that may arise out of this accident. Action to protect NASA's interests is being taken by MSFC Counsel. ✓

that good is an insurance if it doesn't even cover a 2 mph collision with a non-moving object! B

Labor Relations - A work stoppage began about 2:30 p.m. on Thursday, 10/27/66, as a result of a jurisdictional dispute between members of the International Union of Operating Engineers (IUOE) and the United Association (Pipefitters) on the Malan-Koppers contract with the Corps of Engineers. By Friday, approximately 400 members of various crafts unions on this and other Corps of Engineers' contracts were off their jobs. Today, only the Malan-Koppers contract is affected and only operating (IUOE) and pipefitters (UA) are involved but approximately 300 workers are still out and critical schedules for activation of S-IC and S-II A-1 stands are being impacted. It is understood Malan-Koppers plans to refer the matter to the National Labor Relations Board preparatory to seeking injunctions to end the work stoppage. ✓

11/19/66

B 11/2

EO-0 EXPERIMENTS ON AS-210: Dr. Mueller has made a decision to carry the Rack with the payload module on AS-210 and also mount three earth sensing experiments (EO-0) on the Rack. Due to the extra load of these experiments there is an impact on the payload module wherein the structure of the payload module must be strengthened or the Rack re-designed to a full configuration for the new load. We have been requested by MSC to give them an impact (schedule and cost) of providing a full Rack for AS-210 by next week so the various alternatives can be considered and furnished to Dr. Mueller. ✓

FIRST PERIOD PAYLOAD INTEGRATION CONTRACTORS REVIEWS:

The progress of both Payload Integration Contractors for the first three months contract period was reviewed this week at MSFC. The presentations indicated that both Contractors have achieved the objectives of various carrier evaluation, integration facility plans and requirements, and experiment definition. The second contract period, which is beginning now, lasts six months and is expected to contribute significantly to the success of the program because the Contractors' effort will be channeled toward the "real time" in-house planning and design. ✓

CMG PROCUREMENT PLAN: The Control Moment Gyros Procurement Plan was completed and signed by MSFC management October 28, 1966. It was handcarried to Headquarters October 30, 1966. The approval cycle within Headquarters must be completed within one week to maintain the procurement schedule. We are supporting this action with "personalized" attention. ✓

DEPARTMENT OF DEFENSE EXPERIMENTS: A meeting is scheduled at MSFC November 3 and 4, with DOD Experimenters from Wright Patterson Air Force Base. The main topic of discussion will be the location and mounting of the expandable Airlock structure (experiment D-021) in the packaged and deployed mode, both outside and inside the Orbital Workshop. ✓

11/1, 95A

B 11/2

J-2 ENGINE A four-part test was conducted at AEDC on 10-27-66, to investigate the worst expected 204 start conditions and to evaluate the test procedures required for a Saturn V S-IVB restart simulation.

The initial phase of the test was a chill-down of the low pressure ducts after tanking with the pre valve closed utilizing only the recirculation system. The results of the AEDC test were very comparable to the MSFC results--the ducts heated up rapidly once the recirculation pumps were shutoff. This was unexpected, since it was assumed that the altitude environment would result in a slower heatup rate. ✓

The second phase was a 5 second hot firing, employing the worst predicted conditions (best LOX and worst LH₂) for the 204 vehicle. Steam was not used; therefore, an altitude of only 62,000 feet was attained. The run appeared normal, preliminary data indicates that there was no significant vibration count and the OAS generator temperature spike was 1700°F. ✓

The third phase was a "blow-down" test to simulate a restart. The steam ejector was utilized, and an altitude of 90,000 feet was attained. An 8 second fuel lead was employed, and preliminary data indicates that the engine was colder than required. The engine sequence was carried thru start tank discharge valve openings. Preliminary data indicates that the engine was in a "start" condition at the time of programmed cutoff. ✓

The fourth phase was conducted to simulate Saturn V liftoff conditions (thrust chamber chill and boost phase warmup). The steam ejector was used, and an altitude of 106,000 feet was attained. Preliminary test results indicate compatibility with predicted results. Steam blow back into the test capsule was a minimum in both the third and fourth phases. ✓

Three J-2 engines were delivered this week. These engines were allocated to S-IVB 210 and S-II 506. ✓

H-1 ENGINE The second X-rays from the first 15 H-1 switches to be freon flushed will be ready for evaluation on 11-2-66. If the flushing procedure is satisfactory, there are approximately 35 GFP switches and a number of Southwestern owned rejects available for rework. ✓

AS-209 will go through checkout at Michoud with simulators for TOPS. We anticipate having switches installed prior to stage static test. ✓

F-1 ENGINE As a result of the previously reported incident on Engine F-1002-3, the S-IC stage pre valves are no longer considered acceptable for shutting down the F-1 engine. In order to meet the crew safety requirements, Rocketdyne has been directed to provide a redundant cutoff mode for the F-1 engine for S-IC-3 and subsequent. Present plans are to provide an electrically operated solenoid valve to hydraulically operate the four-way control valve utilizing the existing hydraulic override port. Preliminary schedule information indicates that a qualified system for the redundant cutoff will not be available until August 1967, and may require retrofit at KSC for S-IC-3.

High reliability pressure transducer, reported qualified in an earlier report, remains a problem only in delivery schedules. The kits for S-IC-2, previously scheduled for shipment in November 1966, will not be shipped until January 3, 1967, and will probably require retrofit at KSC. ✓

Please

NOTES 10/31/66 CONSTAN

NASA PROCUREMENT CONFERENCE

11/1/66

B4/2

CONSTAN

The Michoud Assembly Facility is hosting the NASA PROCUREMENT CONFERENCE on November 2-3-4, 1966. ✓

NATIONAL SPACE CLUB

The National Space Club on tour of NASA installations arrived at Michoud Assembly Facility about 2 p.m., Friday, October 28, 1966. They were briefed by NASA management and representatives of The Boeing Company and the Chrysler Corporation before touring the Michoud facility. ✓

NOTES 10-31-66 FELLOWS

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B 11/2

Neutral Buoyancy Facility

On Thursday, October 27, Messrs. Gorman, Weidner, Neubert, Newby, and Guilian reviewed past and current consideration with respect to the neutral buoyancy facility. After reviewing all aspects, it was determined that the only way we could proceed with the facility was as development equipment within the ME Laboratory Mock-up Shelter (Building S-4706). ✓

The equipment would be of Spartan design, maximizing in-house work in the tank erection and other requirements. Mr. Cook is working with Facilities & Design, Test and ME to carry out this decision. F&D in essence will operate as project engineer in the overall coordination for this development equipment. ✓

70' dia by 40' high
983

11/1/66

B 11/2

1. Flight Mechanics Panel Meeting: The Eighteenth FMP meeting was held at MSC Oct. 19-20, 1966. Significant points from the meeting are summarized as follows: (1) A panel task team is being established to determine the feasibility of manual booster control and also to determine if LV/SC guidance switchover in earth orbit is within the guidance, dynamics, and control capability of the vehicle (during S-IVB second burn of AS-503 and subs); (2) A skeleton plan for effecting interface weight transfers (payload changes) near launch time due to L/V payload capability changes and/or varying mission requirements due to time of projected launch date, has been prepared; (3) Problem of "quick retargeting" of L/V and S/C for LOR missions due to changes (such as landing ~~sight~~ ^{site} changes), as late as one month prior to launch has been investigated. Plans are being made to accomodate this capability in computer programs, LV/SC interface data exchange requirements, and other procedures. These procedures are planned only for the contingency case of late changes; "nominal" or normally desirable time requirements are considerably longer. Both "nominal" and "quick turn-around" schedules are being documented; and (4) Mission planning work for the AS-209 (AAP) mission has been started. ✓
2. Structures and Materials Panel Meeting (AGARD) Paris, France, Oct. 4-12, 1966: A paper entitled "The Use of Wind Shears in Aerospace Vehicle Design," written by Mr. Robert Ryan of our Dynamics and Flight Mechanics Division, and Mr. James Scoggins of our Aerospace Environment Division, was presented at subject panel meeting by Mr. Robert Ryan. The paper, which is to be published in an AGARD report, was well received. French engineers presented two papers on the same subject. However, their results were of limited use since only ten wind profiles and a rigid representation of the space vehicle were used in their analysis. The Panel decided that the work performed by MSFC fulfills the requirements of NATO in the wind shear area, hence no further work on this subject will be considered by AGARD at the present time. ✓
3. TV Presentation on Meteorology: Mr. J. Kaufman of our Aerospace Environment Division, in cooperation with PAO, is preparing a 1/2 hour TV presentation on the subject of meteorology and its influence on space vehicle design, launch and flight. The presentation, to be broadcast on WHNT-TV (channel 19), Nov. 1, 1966 at 9:30 p.m., will include the following: (1) Definition of meteorological terms; (2) A 12 minute movie entitled "Wind, Weather, and Space Boosters"; (3) A discussion of lower and upper atmospheric data acquisition techniques; and (4) Comments pertinent to weather satellites and weather modification. Mr. Slattery, PAO, will narrate the TV presentation.
4. General Dynamics/Convair-Huntsville Operations: Please see enclosure (Dr. von Braun's copy only). ✓

→ I'd like to see that B

11/19/68

B 11/2

1. S-IC-2 CHECKOUT: The S-IC-2 Laboratory release date has been moved from November 5, 1966, to December 13, 1966. This schedule change will allow approximately five weeks for hardware installation, incorporation of changes, and other work that would have been accomplished at KSC under the previous schedule. The December 13 release date will provide for a more complete vehicle properly tested. ✓
2. S&ID QUALITY SURVEY: The S&ID Quality Survey was accomplished by this Laboratory from October 10, 1966, through October 20, 1966. The survey report is being prepared and will be published prior to November 21, 1966. Highlights of the survey are:
 - Management organizations, quality systems, documentation and reporting systems were found to be adequate and working with one major exception, this being the area of corrective action reporting and followup. ✓
 - The hardware survey team found approximately twenty discrepancies of which approximately fifteen were considered to be of major importance. Most of these discrepancies were the results of S&ID's failure to follow their established system. ✓

NOTES 10/31/66 HAEUSSERMANN

11/1/66

B11/2

1. ATM CONTROL MOMENT GYROS (CMG): Detailed reviews were conducted last week at Bendix and at MSFC of modifications considered necessary to the Langley CMG to make it a qualified ATM flight article. Principal changes include spin bearing redesign, spin motor redesign, and an optimum wheel size selection for ATM configurations. The ATM CMG will be sized at 2000 foot pound seconds of angular momentum to accommodate 209/210/211/212 cluster missions. This 100 percent increase over the Langley CMG size is feasible within the current state-of-the-art without significant dollar and time increases. ✓

2. ATM PRINCIPAL INVESTIGATOR/ASTRONAUT MEETING: A two-day meeting of ATM Principal Investigators (PI's) and Astronauts at MSFC last week resulted in a more thorough understanding of PI experiment requirements and the role to be carried out by the astronauts. Agreement was reached that such meetings would be periodic with the next session planned for 12/5 and 12/6. ✓

NOTES 10/31/66 HEIMBURG

11/1 968

B 11/2

F-1

Test FW-054 was conducted on October 28, 1966, for 125 seconds as intended. Primary purposes of this test were to qualify new static firing configuration of hardwire instrumentation and gimbal filter manifold duct assembly prior to static firing of S-1C-3. Resistoflex (supplier) duct was used for this test. Test scheduled for 125 seconds on Tuesday, November 1, 1966, will use Anaconda (supplier) duct. ✓

S-1C

The S-1C-3 stage acceptance firing has been re-scheduled for November 9, 1966. ✓

S-11-1 (MTF)

A 17 to 20 day delay in the first firing had been called due to debonding of the aluminum foil covering the NARMCO adhesive on the doubler weld inside the lox tank. The flight batteries planned for use in the static firing had been activated and due to the three day life, the battery will be refrigerated. ✓

S-1B

Saturn S-1B-8 arrived at the MSFC Dock on the morning of October 25, 1966, and was installed in the static test stand East on the same day. Connection of electrical and mechanical facility lines is almost complete, and installation of instrumentation is in progress. The short duration test SA-40 is scheduled for November 16, 1966. ✓

11/19/68

B 11/2

1. MARVES: Reference Notes 10-10-66 (Copy Attached). MSC has been briefed on the MARVES System. ✓ This was done by Mr. Mirt Davidson at the Resources Sharing meeting at El Paso on August 18, 1966. Computation Laboratory tries to keep MSC informed on all significant computer programs since they maintain (in abstract form) the MSF Resources Sharing Library. ✓

2. PROBLEMS WITH THE ON-LINE BUSINESS APPLICATIONS:

On Tuesday, October 25, 1966, we experienced major processing difficulties with the IBM 7010/7740 on-line computing system. The troubles, which appear to be a combination of hardware and software failure, have been extremely difficult to diagnose. IBM and Computation Laboratory personnel worked around the clock throughout the remainder of last week and the weekend, with what looks like favorable results. ✓

It was necessary to suspend on-line processing for the Technical Materials and PRINCE applications for most of last week. Emergency procedures for just such a situation were placed in effect, and we hope to be back to a normal processing basis within a day or two, although several days will be required to work out the backlog of transactions. This has been the most serious and prolonged problem we have encountered since beginning an otherwise very successful on-line operation almost a year ago. ✓

ATTACHMENT: Notes 10-10-66 Hoelzer (Copies to Dr. von Braun and Mr. Weidner only)

NOTES 10/31/66 JAMES
11/9/66

B 11/2

AS-204 LAUNCH AND PREFLIGHT REVIEW: Because of spacecraft problems the launch of AS-204 has been slipped into January. Accordingly, we have tentatively rescheduled the Preflight Review for December 7 and 8 in the 10th floor conference room. ✓

AS-204 CREW BRIEFING: The briefing was held as planned on October 25 at MSC. Crew members consisted of the AS-204 primary and backup crews, C. C. Williams who is the astronaut following the launch vehicle, and two other astronauts. The presentation was well received by the crew and no action items resulted from the briefing. All questions were answered from the floor which indicates the quality of the MSFC presenters. They again did a fine job. ✓

SATURN IB FOLLOW-ON PROCUREMENT: Both the S-IB and the S-IVB contracts have been negotiated. It is expected that the signed contracts will be forwarded to Headquarters for approval the second week of November. The cover letter for forwarding the contracts will contain our best estimate of accrued costs and unfilled orders in FY 67 plus restating the requirement for a decision point to go or not to go with the program in January 1967. The I. U. procurement plans are in the process of preparation and will be submitted to Headquarters the second week of November. It is anticipated that the I. U. will require contractual coverage and initiation of long lead time procurement in June 1967. ✓

SA-204 I. U. QUALIFICATION: As you may remember at the conclusion of the DCR there were some I. U. components that had not completed Formal Qualification Tests by IBM. Some problems have arisen in these qualification tests; I feel none are critical at this time but that you should be aware of the facts. About six of the RF components in the I. U. on SA-204 may need minor modifications or replacements for which hardware should be available by November 15, and several electrical components failed to pass the RFI requirements which can be waived. The more optimistic approach taken at the DCR was based on the fact that prior MSFC qualification had been accomplished on the components and these problems resulting from formal contractor qualification tests were not known. We plan to recognize these problems but have them closed out by the time of the SA-204 Preflight Review. ✓

Joint MSFC/MSC Panel for Experiment Compatibility Assessment -
Prior to the 10-24-66 MSFEB Working Group meeting, Mr. Armstrong (MSFEB Secretary) suggested to the R-EO representative, that the coordination of compatibility assessments of experiments, especially in the S-IVB Workshop area, would be improved by the establishment of a joint MSFC/MSC panel. This panel should have representatives from the MSC Experiment Office (Mr. Piland), the Astronaut Group (Mr. Slayton), the Medical Group (Dr. Berry), and the Mission Group (Mr. Craft), as well as from MSFC, R&DO's principal investigators and experiment developers, and from IO for experiment integration. At MSC this coordination is already accomplished by means of the Experiment Review Board, chaired by Mr. Piland. Mr. Armstrong visited MSFC during last week to discuss further details with I-S/AA. It is the position of the Experiments Office that such an intercenter panel should be established within the framework of the existing panel structure. We will investigate this with Mr. Richard's Office and with I-S/AA. ✓

Nuclear Rocket Technology SRT Program Management - Representatives of R-EO and R-ASO met recently to review this subject. In light of the recent assignment of P&VE as lead Laboratory for Nuclear Ground Test Module it seemed appropriate to reassess the working relations between the two offices. It was agreed that to make the formulation of a year-by-year SRT Program more meaningful a long range plan for Nuclear Rocket Technology was needed. R-ASO will develop such a plan. R-EO will continue to work with P&VE (Mr. Brooksbanks) in programming resources for the Fiscal Year effort. ✓

11/1 9/8

B 11/2

1. Back-up Program for S-II LH₂ Elbow Problem: Jointly with P&VE and QUAL Laboratory an in-house support program has been started as a back-up for the LH₂ elbow problem for S-II-501 and -502, in case the present elbow fix on these stages would not be satisfactory. The back-up design for a flanged stainless steel elbow comes from S&ID who will deliver this elbow to us as a kit by November 14, including tooling and hardware. The plan is to install this kit on the S-IC-C fuel test container by means of doublers to which the elbow would be huck-bolted. The installation drawings are furnished by P&VE. The doublers for simulation of the S-II configuration are machined in-house on our numerical controlled die-mill. We hope to complete this installation by November 25 so that hydrostatic tests can be conducted by the end of November. Because of the urgency of the program we will work two 10-hour shifts on this support project. ✓

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2. Rack/PM Module: Manufacturing of the MSFC Rack to be used for the Lunar Mapping and Survey System is under way. Tools and fixtures have been designed and are now being built by Hayes. Of immediate concern to us is the acquisition of twenty (20) fittings per rack which are of a rather complex configuration and are used for tie-in of the Rack to the SLA and also within the Rack structure. Plans to use close die forgings for these fittings have been given up because delivery dates are completely incompatible with our schedules. We are now exploring the possibility of procuring these parts from industry as machined parts, hogged out of large slabs of Aluminum on numerical controlled (NC) milling machines. I doubt, however, whether we will get acceptable delivery promises. For this reason we are now investigating the possibility of manufacturing these fittings in our own shops. The problem is not manpower but lack of machine capacity. Our tape controlled die-mill has operated for the past year on two shifts and has at the present a 6 to 8 months backlog, a high percentage of which, however, is not mainstream work. Of course, the Rack/PM and also ATM would take precedence over most of this backlog of work. We are also studying the feasibility of welding these fittings together out of smaller and less complex parts using the electron beam welding process. ✓

B #12

1. 40K AEROSPIKE THRUST CHAMBER: A complete torus aerospike thrust chamber was tested successfully at Rocketdyne's Reno Test Facility on October 19, 1966. The thrust chamber was built on a company IR&D program. The propellants were gaseous hydrogen and LOX which burned at a mixture ratio of 5.0 in this test, producing a chamber pressure of 360 psi for 1.75 seconds. The water-cooled chamber was not damaged. ✓
2. SATURN IB POGO: Flight evaluation of the first three uprated Saturn vehicles revealed no evidence of POGO instability. Low frequency acceleration levels were well below MSF crew limits. ✓
3. S-II FUEL FEED LINE: Our S-IC-C tank is being modified (P&VE & ME) to test a back-up for the 22-bolt fix of the LH₂ feed line elbow which is on S-II-1 and is being tested on the common Bulkhead Test Tank by S&ID. S&ID did not have the capability to test the back-up fix concurrently with the 22-bolt fix. ✓
4. "O" NPSH PUMP: (Reference Notes of 10-3-66) The "O" NPSH pump concept was proposed by AEROJET, the NERVA engine contractor, and tentatively accepted by Space Nuclear Propulsion Office (SNPO). The pump is expected to be capable of pumping two-phase flow. MSFC has pointed out the design problems, minimum tank pressure for structural reasons, and potential operational problems. At the invitation of SNPO (H. Finger), we have initiated an in-house investigation to establish a more conventional feed system. Our feed system investigation is scheduled for completion in early November, at which time recommendations will be made to SNPO. We will continue to work closely with SNPO on this matter and in other areas concerning the NGTM. ✓
5. INTERMEDIATE & ADVANCED WORKSHOPS: On November 2, our Advanced Studies Office will give a thirty-minute briefing to a group of visiting Air Force officials (including Gen. Williams, Gen. Burge, Col. Hendrix, & others) on ~~growth version of the S-IVB Workshop~~. *This is the Gen Evans MOL Briefing 10/8/11* ✓
6. SAA-209 ORBITAL WORKSHOP: An Orbital Workshop subpanel of the Mechanical Panel is being established with Wilbur Thompson, P&VE, and Will Hoyler, MSC, as the co-chairmen. ✓
7. S-II STAGE-HIGH FORCE TEST PROGRAM: A major milestone was passed on October 16 with completion of the first axis of testing (sine and random) on the forward skirt. The sine run marked the initial use of the new control system on the 8 shaker facility and was completely successful from the test point of view. However, a failure occurred during the low level sine run in container 224. Inserts were pulled from the honeycomb panel where a 60 pound component is mounted. Insert failures have also shown up in container 206 during low level sine testing on the thrust complex. Parallel failure evaluations are being done by North American Aviation and Structures Division dynamics personnel. A failure was also noted in a thrust cone ring frame splice plate after completion of the low level sine tests. ✓
8. RACK-PM: A request for quotation by MSFC on a new approach to this mission has been forwarded by MSC. Apparently, this change was triggered by Dr. Mueller. We are now supposed to look at a full rack with docking structure & additional experiments to be carried simultaneously on the Rack (EO-O). The experiments, batteries, and mounting hardware probably amount to 4,000 lb. to be carried on two plates. These new inputs would most likely cause extensive structural modifications to the existing Rack, which has been released for manufacture, plus the additional design & testing work for the upper half of the Rack and mounting structures. We are studying the impact of this additional design work on the schedule of the present PM requirements, ATM and workshop. All have the same immediate schedules and skill requirements. ✓

NOTES 10/31/66 MAUS

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4/2

Negative Report.

NOTES 10/31/66 RICHARD

No submission this week.

11/19/68

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B 1112

NOTES 10/31/66 RUDOLPH

11/1 958

1. A Technical Management Support Functions Ad Hoc Committee - has been formed by Dr. Seamans for the purpose of determining if there is a need for increased policy centralization at Headquarters Staff level for technical management support functions such as (1) Configuration Management, (2) Data Management, (3) Logistics, (4) etc.

Jim Murphy, Saturn V Deputy Manager for Management is the MSFC representative on this committee and it appears this assignment will take 100% of his time for at least the next 30 days.

MSFC presentations to the committee on our approaches in the technical management support functional areas are scheduled in Washington on Tuesday, 1 November 66. Mr. Newby, DEP-A and Mr. Andressen, IO will accompany the MSFC presentation team. ✓

2. S-IC-3 Stage - successfully completed propellant load tests on Wednesday, 26 October 66. With this test accomplished, there is a high probability that the acceptance firing will occur on Thursday, 3 November 66. ✓

3. S-II-1 Stage Status:

- o On Thursday, 27 October 66, the decision was made to re-enter the LOX tank for an inspection of the aluminum foil seal on the aft LOX Bulkhead dollar weld doubler.
- o The decision to re-enter the LOX tank was based on a leaking condition of the aluminum foil seal discovered on the S-II-3 stage at Seal Beach.
- o On Friday, 28 October 66, the LOX tank was re-entered and the inspection revealed that:
 - the aluminum foil seal over the aft LOX Bulkhead dollar weld doubler was debonded in at least one area on the edge of the seal (debonded edge of 6" to 8").
 - the debond would have permitted LOX to contact the NARMCO adhesive (LOX sensitive) during tanking for the first firing.
- o Analysis is currently underway as to the type of fix or repair required to correct the problem.
- o Complete assessment of schedule impact on the first static firing of S-II-1 Stage cannot be made until a decision is reached as to type of fix or repair. ✓

NOTES 10/31/66 SPEER

B 11/2

11/1 952

1. AS-204 CREW BRIEFING: As part of the final flight crew briefing organized by Col. James' Office, Mr. Casey of our Flight Control Office at MSC presented on 10/25 the flight control capabilities and functions for this mission. An additional meeting with the crew is scheduled for a discussion of the Flight Mission Rules. ✓

2. HOSC ADDITION: Bryson Construction Company of Decatur, Ala. has been awarded the contract for the HOSC addition. The pre-construction conference was held on 10/25/66 and purchase orders for critical steel, electrical and mechanical items have already been placed. According to terms of the contract we may have joint occupancy on 3/8/67 and completion of construction on 3/23/67. ✓

3. FUNDING FOR REAL TIME WIND DATA: The 25 K required for additional equipment in the KSC Central Instrumentation Facility will now be funded by KSC. The original request was for MSFC to pay for this equipment which raised several principal questions. Gen. O'Connor succeeded in reversing KSC's position. The equipment will be used to enter radar data directly into the KSC Datacore where we have access through LIEF data link. ✓

B_{10/2}

OK Bob
Bennie
I would
to attend
at least
part of it
B

1. ATM: A meeting was held this week among the P.I.'s of the ATM experiments (Tousey, Kirkland, Goldberg, Giacconi, Milligan) or their co-investigators with the scientist astronauts (Michel, Lind, Gibson, Anders). This first exchange of views was considered very valuable by all concerned and should be repeated each six to eight weeks. The next meeting is set for December 5 and 6 at MSFC. Here are a few points which came out of this first meeting: (a) Several of the P.I.'s, such as Dr. Tousey, would like to have the astronaut as part of their scientific team. The astronaut should do as much experimenting as possible. (b) The P.I.'s were exposed to the fact that continued voice communication is probably not available. Major Anders mentioned 20 - 50% communication as a more realistic estimate. (c) The uncertainty of the experiment time (14, 28, or 56 days) affects the layout and planning of the experiment. (d) Repair capability or redundant command capability to be used by the astronauts has to be known at the beginning of the experiment layout. Such capabilities have to be designed into the experiment. ✓ These are only a few points. We are combining our notes on the discussions, and will furnish them to Art White and Bill Horton for the minutes of the meeting to be published by Astrionics Laboratory. ✓
2. EMR: Dale Ruth and I presented the EMR plans to the Astronomy Subcommittee on October 25. A long discussion followed, and we received many encouraging comments, plus a request to consider two or three more experiments for possible inclusion in EMR (cosmic rays, energetic gamma rays, UV). Two days later, Dr. Roman informed me that the Subcommittee wishes to consider a large number of potential flight experiments for EMR at the next meeting before endorsing a plan for an EMR satellite. We are now continuing our work with the experiments we originally selected, and we will consider several more experiments for possible inclusion. The proposal will be discussed again in the February meeting of the Subcommittee.

11/1/66

B11/2

1. Lunar Study Activity: We had a good MIMOSA (Mission Modes and Systems Analysis for Lunar Exploration) review on October 27 with Lockheed (the MSFC contractor) and the entire study panel, including representatives from OMSF, OART, OSSA, JPL, Bellcomm, Corps of Engineers, IITRI, MSF, and KSC. I would like to review the results thus far and the implications to MSFC and our lunar activities as well as our plans for the remainder of the study. A 1-1/2 to 2-hour meeting would be desirable at your convenience (suggest week of November 7). ✓ *Bonnie Please arrange 11/14*
2. Space Station Committee: We have now eliminated the "possible" discrepancies between our work and the Donlan committee and will present the updated space station material to Seamans on November 15 in Washington. ✓ *B*
3. Bids are due November 7 on the RFP for "Study of Spent Saturn S-IVB Stage Utilization for Support of Earth Orbital Missions." The Saturn S-IVB for AS-210 has encountered fabrication difficulties which could lead to rejection of the stage. In the event that the tank structure is rejected, a memorandum is being prepared to Mr. Roberts, I-I/IB-S-IVB, requesting that the tank be placed in reserve for potential utilization in orbital workshop applications. ✓ However, current opinion in the S-IVB office is that eventually the stage will be accepted for flight on AS-210. Two Form 1122s were submitted for FY-68 funds as follows:
 - a. Definition of S-IVB Workshop Experiments for AS-216 and AS-219 - - - \$500K ✓
 - b. Definition of Ground Launch S-IVB Workshop and Associated Experiments - - - \$1500K. ✓
4. Pogo: The Pogo RFQ was delivered to Bell Aerosystems on Friday, October 28. A meeting at Langley Research Center is set for Wednesday, November 2, to reschedule and finalize plans for this demonstration test. Personnel from MSFC, MSC, Headquarters, and Bell will meet with the Langley Research Center people. We have been told that the RFQ response time will be 15 days, and since the Langley Research Center meeting should iron out all the interfaces, negotiations should be easy and, hopefully, the contract signed about November 20. ✓
5. Synchronous Orbit Mission Planning: The primary experiment group has been selected for the first cut at experiment scheduling and mission compatibility check. This first iteration will be completed this week. A meeting will be held between the mission analysis coordination group and the experiments investigators on October 31, 1966, to review the mission approaches with the investigators and to evaluate the ability of the proposed mission to satisfy minimum experiment requirements. ✓

Secondary experiments (mission fillers) have not been selected; several are under consideration that are in the area of astronomy and space physics. Further coordination of these experiments with the NASA program offices is required. (This is being done in support of Lee Belew.) ✓